HITCHCOCK'S Machine Tool
BLUE BOOK
FOUNDED AUGUST 1940 1905

Service Die and Engineering Company, Detroit, made this complete die on the DoAll. It is used to make the glove compartment on the instrument panel of a well-known automobile.

DO-ALL Contour Machine BAND SAWING BAND FILING BAND POLISHING

DIE — 2¼" thick mild steel was sawed out in 1¾ hours.
PAD — 1½" thick air die steel, sawed out in 2½ hours. 25 pounds of steel were saved.
STRIPPER — ¾" cold roll, sawed out in 45 minutes.
KNOCKOUT — ¾" cold roll, sawed out in 30 minutes.
CAM DRIVES — (on the DoAll table) — 2½" oil hardened tool steel, sawed out in 20 minutes each. Later they were welded to base.

Two DoAll Contour Machines and one DoAll Band Filer are kept busy 24 hours a day in this modern plant.

The DoAll is a moderately priced, rugged machine tool that replaces shaping, milling and lathe work with enormous savings of time, labor and metal.

Send for Free 158-page Metal Working Handbook.

CONTINENTAL MACHINES, INC.
1300 SO. WASHINGTON AVE. MINNEAPOLIS, MINN.

HERE is one of 100 uses

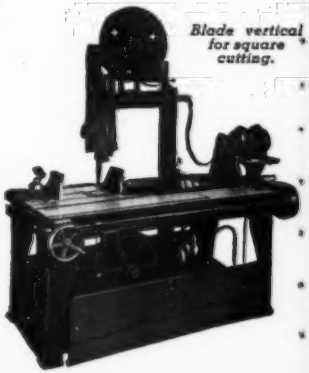
Blade tilted to 45° for mitering

on a truly universal metal cutting band saw —a mitre cut at 45° through an 18" I beam.

Work always remains stationary. The column is mounted in a traveling ball bearing carriage that feeds the blade through the work.

Straight cutting, cutting angles, mitres, notching and coping are a few of the many jobs which may be done fast and accurately with this large (18"x18") MARVEL Band Saw.

Blade vertical for square cutting.



MARVEL

No. 8 METAL CUTTING BAND SAW

Save machining time, save roughing-out time, save many hours on many jobs with this versatile saw—a machine that will give accurate dependable service, on delicate small work as well as on large bars and structural shapes.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5741 Bloomingdale Ave., Chicago, U.S.A.

Eastern Sales Office: 199 Lafayette St., New York

Again Contractors find it "Pays to use **HOBART WELDERS'**

Remote Control with HOBART *Simplifie Welding of New York's Mammoth Midtown Tunne*

(PHOTO COURTESY I. E. WELDING CO., NEW Y

• No matter what job you ask Hobart Arc Welders to you'll find they produce better quality welds, easier, fas at lower cost. Exclusive Hobart features alone pay for y welder in time and labor saved . . . note Hobart's Rem Control in the construction of New York's Midtown Tun

REMOTE CONTROL enables the operator to change welding heat at the work. No need to chase back to the we when working in difficult positions . . . and you get this ex sive Hobart feature at no extra cost!

MULTI-RANGE CONTROL gives you a choice of 1,000 combinations of welding heat, instantly available you get exactly the heat you want without a single "d spot". No wonder better welds are assured with a Hob

Whatever your welding problem, there's a Hobart mo that will do the work better, and at LOWER COST! Ho always gives more for your dollar! Send the coupon bel

HOBART BROS. CO. Box TB-640 Troy, O

"One of the World's Largest Manufacturers of Arc Welde

To: Hobart Bros. Co., TB-640 Troy, O

Without obligation, send me information on Hob Arc Welders I've checked below:

- ☐ How Profits in Simplified Arc Welding
- ☐ New Hobart Catalog and Special Prices
- ☐ How to Build Your-Own Portable Welder
- ☐ Electric Drive
- ☐ "Build Your Ow
- ☐ Gasoline Drive
- ☐ A. C. Arc Weld

Details on ☐ 30 Days Trial ☐ Easy Te

Interested in _____amp. capacity.

NAME _____

FASTEST SELLING ARC WELDER ON THE MARKET TODAY

Spring tempered COLLETS

Order From Stock

Scientifically heat treated to a true spring temper, "Rivett Mark" collets resist wear and hold their spring longer than collets of any other make. As standard equipment on all makes of lathes and millers, (see Rivett Bulletin 1008) they may be ordered for immediate delivery from the following stocks:—

CHICAGO
R. E. Ellis Engineering Co.
565 W. Washington Blvd.

DETROIT
Charles A. Strelinger Co.
149 E. Larned Street

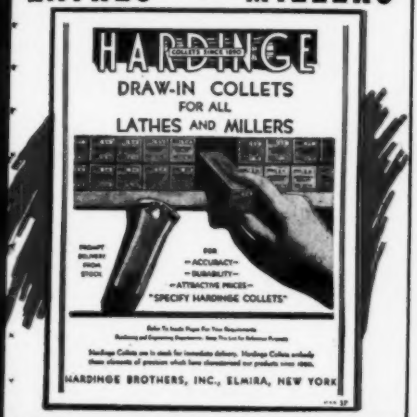
BOSTON
Rivett Lathe & Grinder Inc.
18 Riverview Road, Brighton

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

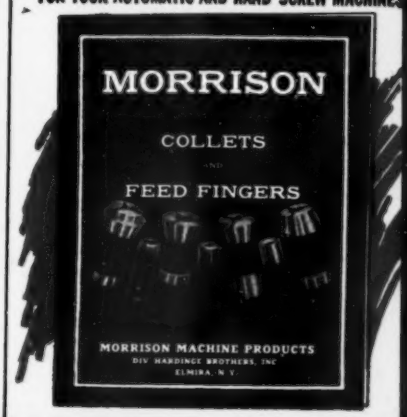
Make certain that you have this bulletin No. 37 which lists attractive prices and gives information and dimensions to make ordering of standard collets easy.

Complete catalog No. 34 presents ordering information and attractive prices for standard and master collets and feed fingers.

DRAW-IN COLLETS
FOR YOUR LATHES AND MILLERS



— COLLETS —
FEED FINGERS AND PADS
FOR YOUR AUTOMATIC AND HAND SCREW MACHINES



SJOGREN
PRONOUNCED "SHOW-GREN"

The amazing fast action of the Sjogren Speed Collet Chuck gives it full right to its name. An effortless turn of the hand-wheel, one way or the other, automatically opens or closes the collet, gripping or releasing the work as desired. With the Sjogren Speed Collet Chuck, the operator is always in front of his work and he stays there. Supplied for direct mounting to either threaded or standard type of spindle nose. Available in three sizes to 1¼" capacity. A distributor is located near you. Write for his name and address.

Hardinge

COLLET INDEX FIXTURE

1" capacity through collet. Index Plate has 24 holes. Furnished for other collets and with either 2, 3, 4, 5, 6, 8, 10, 12, 15 or 30 hole Index Plate. Available separately or with a Tailstock and Sub Base.

FOR LOW COST TIME SAVING ACCURACY CAPACITY ADAPTABILITY

Expensive holding devices for different operations are no longer necessary because Hardinge offers a Collet Index Fixture for many uses. Its adaptability to miller and grinding applications as well as its use with a shaper or drill press makes it indispensable in modern tool rooms and production departments and its low price justifies immediate use.

WRITE TO HARDINGE BROTHERS, INC., ELMIRA, N.Y. FOR COMPLETE

ARMSTRONG

Tool Holders and Tools

There are basic qualities in all ARMSTRONG TOOLS that set them apart from the ordinary run. They are stronger, have a wide safety factor of extra strength, more expertly designed—are exactly suited to their use, are handier and better balanced and are finely finished. The type of tools that develop pride in ownership, that encourage better work.

Products of 50 years of quality tool making and every modern manufacturing facility, they are your safest tool investment. Standardize on:

ARMSTRONG TOOL HOLDERS
ARMSTRONG WRENCHES
ARMSTRONG "C" CLAMPS
ARMSTRONG TURRET LATHE TOOLS
ARMSTRONG RATCHET DRILLS
ARMSTRONG SETTING-UP TOOLS
ARMSTRONG LATHE and MILLING MCH. DOGS
ARMSTRONG HIGH SPEED STEEL and MACHINE SHOP SPECIALTIES

ARMSTRONG BROS.

Better Pipe Tools

ARMSTRONG BROS. Pipe Tools were designed after exhaustive tests of other pipe tools. Each is an improved tool (a better designed, better balanced, and handier tool) with hardened alloy steel, hardened or drop forged parts wherever they will add to tool strength or tool life. Together, they comprise the most complete line of pipe tools manufactured.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

308 N. Francisco Ave. - - - - - Chicago, U. S. A.
Eastern Warehouse & Sales: 199 Lafayette St., New York

HITCHCOCK'S

MACHINE TOOL BLUE BOOK

29,500 THIS ISSUE *AUGUST 1940* *VOLUME 35, No. 8*

CCA

THIS MONTH

Cutting the Cost of Cuts
by H. J. Chamberland 25

Stepping-Up Production 38

How Long Is A Rod? 42

Clamp Shoes and Plugs
by H. F. Williams 49

Building Your Own Comparator
by Joseph Dauber 61

Testing Machinability
by Francis A. Westbrook 65

Unshackle Arc Welding
by C. M. Taylor 67

The Editor's Page 23

What's New in The Industry 71

Mechanics Through the Ages 148

New Trade Literature 158

New Equipment Catalogs 159

Buyers' Service 162

Index to Advertisers 193-195

Published Monthly by Hitchcock Publishing Company . . . 508 South Dearborn Street . . . Chicago, Illinois, U. S. A . . . Geo. O. McKibben, President . . . J. E. Hitchcock, Vice President . . . . . Robert C. VanKampen, Business Manager . . . Wesley G. Paulson, Editor . . . M. L. Yonts, Manager Copy Service Department . . . D. C. Funk, Circulation Manager.

REPRESENTATIVES: New England—Warren E. Hoffman, 269 S. Marshall Street, Hartford, Conn. . . . New York City—A. E. Wailes, 55 West 42nd Street, . . . Ohio,—Dudley B. Trott, 12227 Clifton Blvd., Lakewood, . . . West Coast—Robert H. Deibler, 2461 Sleepy Hollow Drive, Glendale California, Phone: CHapman 5-3300.

(Copyright 1940, by Hitchcock Publishing Co.)

THE JOKE'S ON YOU.. *When Tools* FAIL

Quality suffers when tools commence to deteriorate.

Production schedules are shattered when tools fail. Expensive machines and workers are idle.

Many tool failures can be forestalled by foresight—by careful, scientific conditioning of the tools before the run is started.

Many expensive tools can be reclaimed from the scrap heap and restored to better-than-original-efficiency at far less than replacement cost.

That's the kind of broad and comprehensive tool service we offer—backed by the latest modern equipment—experts with 29 years of experience in tool reconditioning—and a Coast-to-Coast organization with offices in 30 of the principal cities to give you dependable advice on tool problems.

Master Service embraces:

Tool Salvage—scientific cutting without annealing of cutters, end mills, reamers, drills, files, etc.

Rebuilding of pneumatic tools—restoring them to original size and efficiency with Hard Chrome Plating.

Making of Master Chipping Hammers with "Lifetime" valve blocks.

Extending useful life of machine parts and wearing surfaces of tools and dies with Hard Chrome Plating.

Let us send you catalogs giving the whole story. Just attach the coupon to your letterhead and mail to the nearest office.

MASTER TOOL CO., INC.	MASTER CHROME SERVICE, INC.	EASTERN CUTTER SALVAGE CORP.
EVELAND, OHIO	CLEVELAND, OHIO	NEWARK, NEW JERSEY

ATTACH TO YOUR LETTERHEAD AND MAIL TO NEAREST OFFICE.

Name .....

Firm .....

Address .....

Faster Faster!

Speed up production—

For small drilling we have designed the new Motor-Avey MA-8 for intensive high speeds.

Eight spindle speeds 1200 rpm to 12000 rpm. Push button control —one to six spindles—all features that will keep production up and costs down.

Avey

Send for details of the complete line of Avey Drilling Machines— There's one for every line of work.

THE AVEY DRILLING MACHINE CO.

CINCINNATI OHIO, U. S. A.

Modernize

Your Machine Shop in Preparation for the DEFENSE PROGRAM

AND TO MEET TODAY'S PRODUCTION DEMANDS

An up-to-date Machine Shop is the only kind that can hope to meet present day demands. With the National Defense Program, and the general need for increased production, industrial equipment must be prepared to deliver.

Berkeley Drives will help step up production without remodeling or enlarging your plant, through speedier, more flexible and more efficient performance of your present machine tools.

No single type of drive fully meets every operating condition. Therefore, Berkeley manufactures four different drives for all kinds of machines and jobs. The V-Belt and V-Belt-Helical Gear Combination, P. O. S. (Positive Optional Speed), and Quick Change Gear Drive—and each drive is built specifically for your machine by drive specialists.

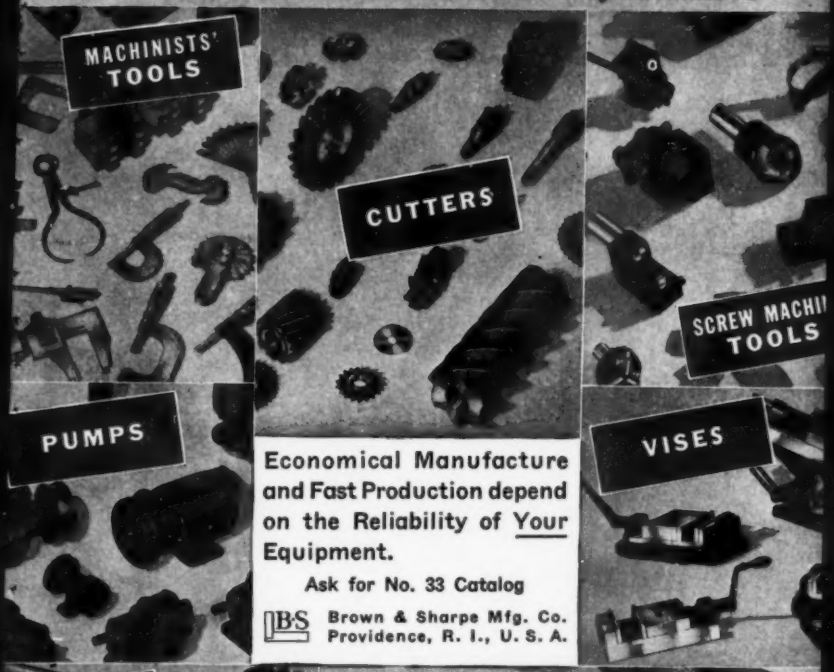
You'll find it profitable to write for more information on these Modern Drives.

The BERKELEY EQUIPMENT CO.

CORRY, PENNSYLVANIA

RELIABLE EQUIPMENT

....FOR A WIDE VARIETY OF SHOP REQUIREMENTS

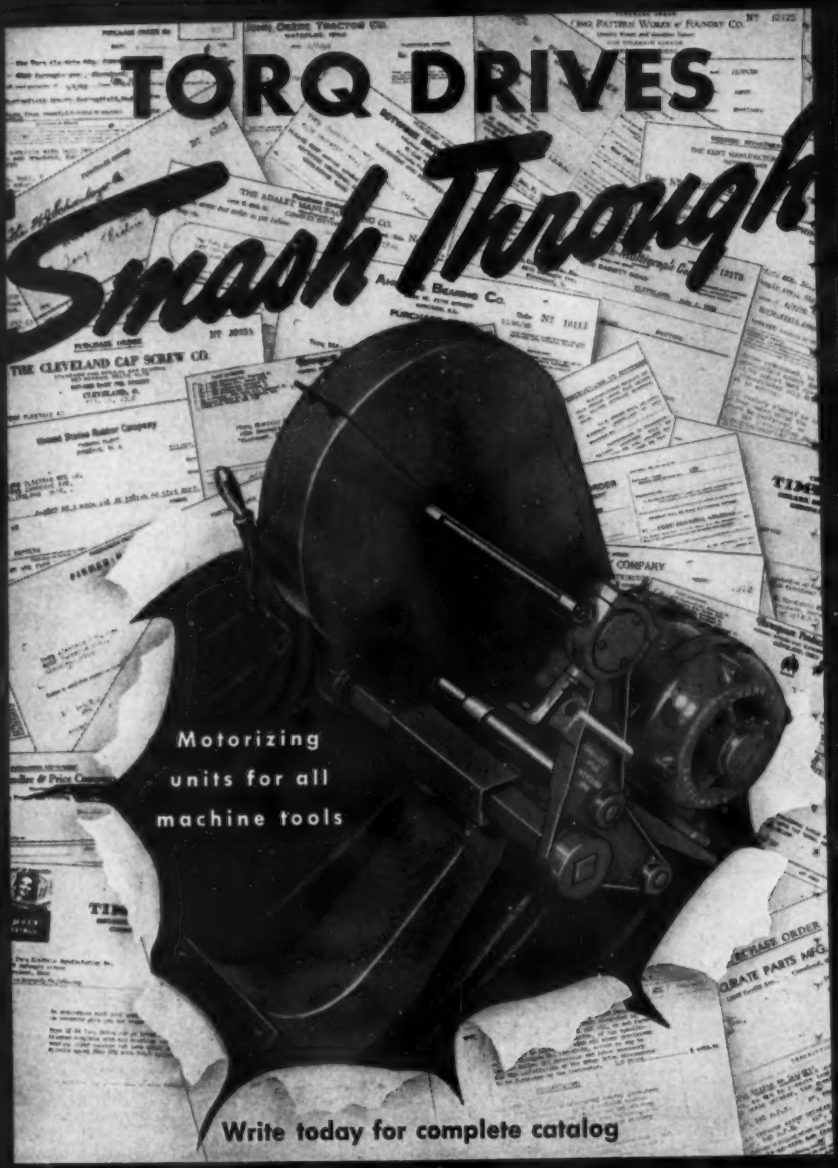


Economical Manufacture and Fast Production depend on the Reliability of Your Equipment.

Ask for No. 33 Catalog

B·S Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

BROWN & SHARPE


TORQ DRIVES
Smash Through
THE CLEVELAND CAP SCREW CO.
Motorizing
units for all
machine tools
Write today for complete catalog
THE TORQ ELECTRIC MFG. COMPANY

THIS FAST, ACCURATE, EASY HANDLING CUTS THE COST OF STRAIGHTENING OPERATIONS

Hannifin hydraulic straightening presses equipped with the exclusive sensitive pressure control provide an operating cycle that allows remarkably fast, accurate, and easy handling of work. Because this new type of press control provides a sensitive control of *pressures* exerted by the ram, in proportion to the amount of control lever movement, the operator has any pressure up to full capacity available at his finger tips. Skillful, accurate handling is easier than ever before, with consequent increases in production rates and improvement in quality.

Hannifin straightening presses are available with capacities and dimensions to suit individual needs; modifications in frame dimensions, table design, and ram travel are readily made without penalty in cost or delivery, due to Hannifin standardized design and welded frame construction. Write for bulletins giving specifications of many types, or consult Hannifin engineers for detailed recommendations.

HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Ave., Chicago, Illinois

HANNIFIN
HYDRAULIC PRESSES

TORQ DRIVES

Smash Through

Motorizing units for all machine tools

Write today for complete catalog

THE TORQ ELECTRIC MFG. COMPANY

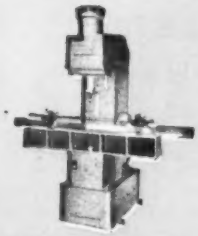
THIS FAST, ACCURATE, EASY HANDLING CUTS THE COST OF STRAIGHTENING OPERATIONS

Hannifin hydraulic straightening presses equipped with the exclusive sensitive pressure control provide an operating cycle that allows remarkably fast, accurate, and easy handling of work. Because this new type of press control provides a sensitive control of *pressures* exerted by the ram, in proportion to the amount of control lever movement, the operator has any pressure up to full capacity available at his finger tips. Skillful, accurate handling is easier than ever before, with consequent increases in production rates and improvement in quality.

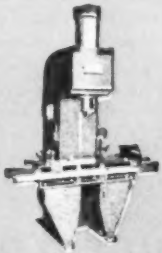
Hannifin straightening presses are available with capacities and dimensions to suit individual needs; modifications in frame dimensions, table design, and ram travel are readily made without penalty in cost or delivery, due to Hannifin standardized design and welded frame construction. Write for bulletins giving specifications of many types, or consult Hannifin engineers for detailed recommendations.

HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Ave., Chicago, Illinois

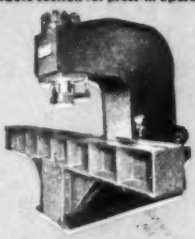
HANNIFIN
HYDRAULIC PRESSES



20-ton straightening press.



25-ton straightening press with removable table section for press-fit operations.



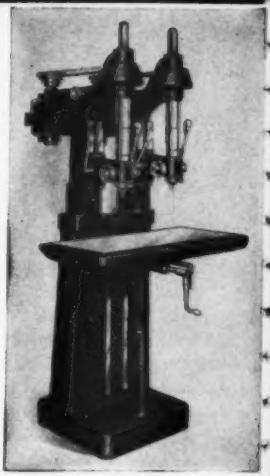
75-ton straightening press with 36 in. reach. Straightening table removable for press-fit operations on lower table.

Hannifin sensitive pressure control gives an infinitely variable control of *ram pressures* by either hand lever or foot pedal. Initial lever movement gives rapid approach stroke at nominal pressure. Further lever movement causes increasing ram pressure, up to full capacity. Release of lever automatically gives rapid return stroke to top ram position. Up-travel of ram is adjustable.

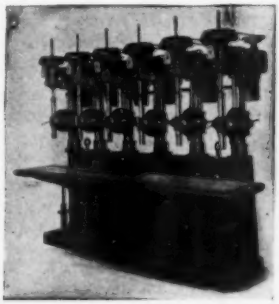
FASTER . . . FASTER . . .
FASTER DRILLING!

If speed is the cry in your plant—and drilling is slowing down production schedules—better consider what Buffalo Drills can do for you! Here are fast power drills designed to make operation easy—with controls handily placed to require a minimum of effort. Here, too, is accuracy that will amaze you—and maintenance costs you can practically forget about . . . Buffalo's complete line of drills includes models from the 14-inch High Speed to the 22-inch Heavy Duty.

Literature on request.



14' Two Spindle Drill



16' Six Spindle Drill

BUFFALO FORGE COMPANY
161 Mortimer St., Buffalo, N. Y.
Canadian Blower & Forge Co. Ltd., Kitchener, Ont.

15' Bench Drill

"Buffalo"

SINGLE AND MULTI-SPINDLE POWER DRILLS

The D-100 **POWERPLUS** Grinder for 6" wheels weighs only 9 3/4 lbs!

(More Power than you can use)

ROTOR TOOL COMPANY

CLEVELAND, OHIO

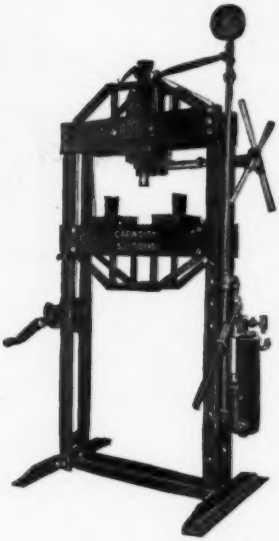
KRW HYDRAULIC ARBOR PRESSES

HAVE SPEED AND POWER FOR INDUSTRIAL USE

Rack teeth cut directly into ram—no separate rack bar.

Heavily constructed enclosed drum and ratchet raises and lowers bed.

Extensible cross-arms for greater leverage have locating grooves for extended and central positions.



Oil reservoir tank has convenient filling plug and shut-off valves.

V blocks furnished have machined shoulders for accurate alignment on bed.

Machined shoulders align V blocks when in inverted position and prevent slippage.

Built with the speed and strength necessary for industrial use, KRW Presses perform such operations as broaching, assembling, straightening, bending, offsetting, squeezing, pressing, and flattening. Small blanking operations can be performed when the blanking dies are built into a die set provided with guide pins.

Strictly a one-man press, special KRW features minimize operator fatigue. Trussed design of bed and crown members results in extreme rigidity and accuracy.

Write for new bulletin describing this cost-cutting equipment.

PRICES F. O. B. FACTORY, ARCADE, N. Y.

PRICES SLIGHTLY HIGHER WEST OF ROCKIES

No. 37—25 ton Hydraulic and Sensitive Arbor Press	$180.00
No. 37E—50 ton Hydraulic and Sensitive Arbor Press	235.00
No. 37F—75 ton Hydraulic and Sensitive Arbor Press	365.00

K. R. WILSON

27 Lock Street, Buffalo, N. Y., U.S.A.

Export Department
90 West St., New York, N. Y.

West Coast Branch
722 Mateo St., Los Angeles

STANLEY No. 566 PORTABLE GRINDER

This rugged, powerful grinder is just what you need for grinding and smoothing welds on the many jobs too large to be taken to a stationary grinder. The powerful Universal motor drives it at 2600 r. p. m. under full load. Seal type ball bearings and nickel steel gears insure trouble-free operation and long life. Ample capacity to take care of any job requiring a portable grinder. No. 565-5" Wheel, No. 566-6" Wheel.

Ask your Stanley distributor for demonstration on this or other Stanley Electric Tools for your work, or write for literature. Stanley Electric Tool Division, The Stanley Works, 141 Elm Street, New Britain, Connecticut.

STANLEY ELECTRIC TOOLS

A Complete Line For Industry STANLEY ***Cost Less Per Year***

STANLEY GRINDERS
Bench, toolroom and portable grinders with powerful motors and Stanley ruggedness.

STANLEY UNISHEARS
Portable and stationary models for all sheet metal cutting.

STANLEY DRILLS
Rugged, powerful, balanced, in sizes to handle your work.

STANLEY SANDERS
"Stripped for action"—easy to handle—plenty of power.

Acme Steel Co.
Ajax Flexible Coupling Co.
Allis-Chalmers Mfg. Co.
American Can Co.
American Chain & Cable
American Gas Furnace Co.
American Laundry Mach.
American Locomotive Co.
Anaconda Copper Mining
Anchor Post & Fence Co.
Appleton Electric Co.
Armstrong Machine Works
Atlas Lumnite Cement Co.
Atlas Powder Co.
Bakelite Corp.
Baldwin Belting & Leather
Baldwin-Duckworth Div.
Baldwin-Southwark Corp.
W. F. & John Barnes Co.
Bethlehem Steel Co.
Black & Decker Mfg. Co.
Blaw-Knox Co.
Brown & Sharpe Mfg. Co.
Bucyrus Erie Co.
Bullard Co.
Butler Mfg. Co.
Byers Machine Co.
Calco Chemical Co.
Canadian Ingersoll-Rand
Canadian Westinghouse Co., Ltd.
Carboloy Co., Inc.
Carrier Corp.
Carter Carburetor Co.
Celluloid Corp.
Century Electric Co.
A. B. Chance Co.
Chicago Bridge & Iron Co.
Chicago Molded Products
Cincinnati Bickford Tool Co.
Cincinnati Milling Machine Co.
Cincinnati Shaper Co.
Clark Controller Co.
Cling Surface Co.
Colgate-Palmolive-Peet Co.
A. M. Collins Mfg. Co.
Columbia Alkali Corp.
Combustion Engineering Co.
Continental-Diamond Fibre Co.
Copperweld Steel Co.
Cornell-Dubilier Elec. Corp.
Crown Cork & Seal Co.
Cuno Engineering Corp.
Cutler-Hammer Inc.
Detroit Rex Products Co.
Diehl Mfg. Co.
Ditzler Color Co.
Dodge Mfg. Corp.
Dole Valve Co.
Domestic Engineering Co.
Duff-Norton Mfg. Co.
DuPont Co.
Durez Plastics & Chemicals
Thomas A. Edison Co.
Ex-Cell-O Corp.
Fafnir Bearing Co.
Fairbanks Morse & Co.
Farrel-Birmingham Co., Inc.
Ferranti Electric, Ltd.
Flintkote Co.
Foote-Burt Co.
J. B. Ford Sales Co.
Foster Wheeler Corp.
Foxboro Co.
Frick Co.
Frontier Roller Bearing Co.
Fulton Syphon Co.
General Electric Co.
General Railway Signal Co.
Gisholt Machine Co.
Globe Steel Tubes Co.
B. F. Goodrich Co.
Gould Pumps, Inc.
Graver Tank & Mfg. Co.
Graybar Electric Co.
A. P. Green Fire Brick Co.
Guardian Electric Mfg. Co.
Hamilton Mfg. Co.
Hays Corp.
Heald Machine Co.
Hinde & Dauch Paper Co.
Hercules Powder Co.
Hevi Duty Electric Co.
Hilo Varnish Corp.
Holstream Heater Co.
Hyatt Bearings Div.
Hygrade Sylvania Corp.
Independent Pneumatic Tool Co.
Ingersoll-Rand Co.
Insley Mfg. Corp.
International Nickel Co.
Jay Mfg. Co.
Keasby & Mattison Co.
Koehring Co.
Lamson & Sessions Co.
Landis Tool Co.
R. K. LeBlond Machine Tool Co.
R. G. LeTourneau, Inc.
Lignum-Vitae Products Corp.
Lindberg Engineering Co.
Link-Belt Co.
Locke Insulator Co.
Magnus Chemical Co.
Manhattan Rubber Mfg. Div.
Mason-Neilan Regulator Co.
Matthesen Alkali Works
Mattison Machine Works
Milcor Steel Co.
Mono Service Co.
Monsanto Chemical Co.
Morganite Brush Co.
Morse Chain Co.
National Automatic Tool Co.
National Carbon Co., Inc.
National Process Co.
Nation Vulcanized Fibre Co.
Neptune Meter Co.
New England Coke Co.
New Jersey Zinc Co.
N.Y. Belting & Packing Co.
Nicholson File Co.
Northern Electric Co., Ltd.
Norton Co.
Nova Engine Co.
Ohio Brass Co.
Owens-Corning Fiberglas Corp.
Owens-Illinois Glass Co.
Pangborn Corp.
Pennsylvania Salt Mfg. Co.
Permutit Co.
Philadelphia Quartz Co.
Pittsburgh Equitable Meter
Pittsburgh Reflector Co.
Pneumatic Scale Corp.,
Read Machinery Co., Inc.
Reeves Pulley Co.
Reliance Elec. & Eng.
Republic Bank Note Co.
Republic Flow Meters Co.
Republic Steel Corp.
Reumans Prod. & Chem. Co.
R. W. Rhoades Metaline Co., Inc.
Robins Conveying Belt Co.
Rockbestos Products Corp.
John A. Roebling's Sons Co.
Roter Tool Co.
Joseph T. Ryerson & Son, Inc.
S K F Industries, Inc.
Sangamo Electric Co.
Scott Paper Co.
Shepard Mills Crane & Hoist
Simonds Saw & Steel Co.
Sloan Valve Co.
W. W. Sly Mfg. Co.
Stanley Works
Superheater Co.
Surface Combustion Corp.
Taylor Instrument Co.
Thermoid Co.
Thew Shovel Co.
Timken-Detroit Axle Co.
Timken Roller Bearing Co.
Truscon Steel Co.
Union Carbide Co.
Union Steel Products Co.
Unitcast Corp.
U. S. Pipe & Foundry Co.
U. S. Rubber Co.
U. S. Steel Corp.
Edward Valve & Mfg. Co.
Vickers, Inc.
Edward W. Voss Machinery Co.
Wagner Electric Corp.
Walton Truck Co.
Warner & Swasey Co.
Waukesha Motor Co.
West Disinfecting Co.
West Elec. Instrument Corp.
West Penn Power Co.
Western Precipitation Corp.
Westinghouse Elec. & Mfg.
Weyerhaeuser Sales Co.
Wheeler Reflector Co.
Wickwire Spencer Steel Co.
Edwin L. Wiegand Co.
Wilson Chemical Instr. Co.
Wiremold Co.
Wolverine Tube Co.
York Ice Machinery Corp.
Irvington Varnish & Res.
Johnston & Johnston, Inc.
Johns-Manville Co.
Okonite Co.
Osburn Mfg. Co.
Otis Elevator Co.

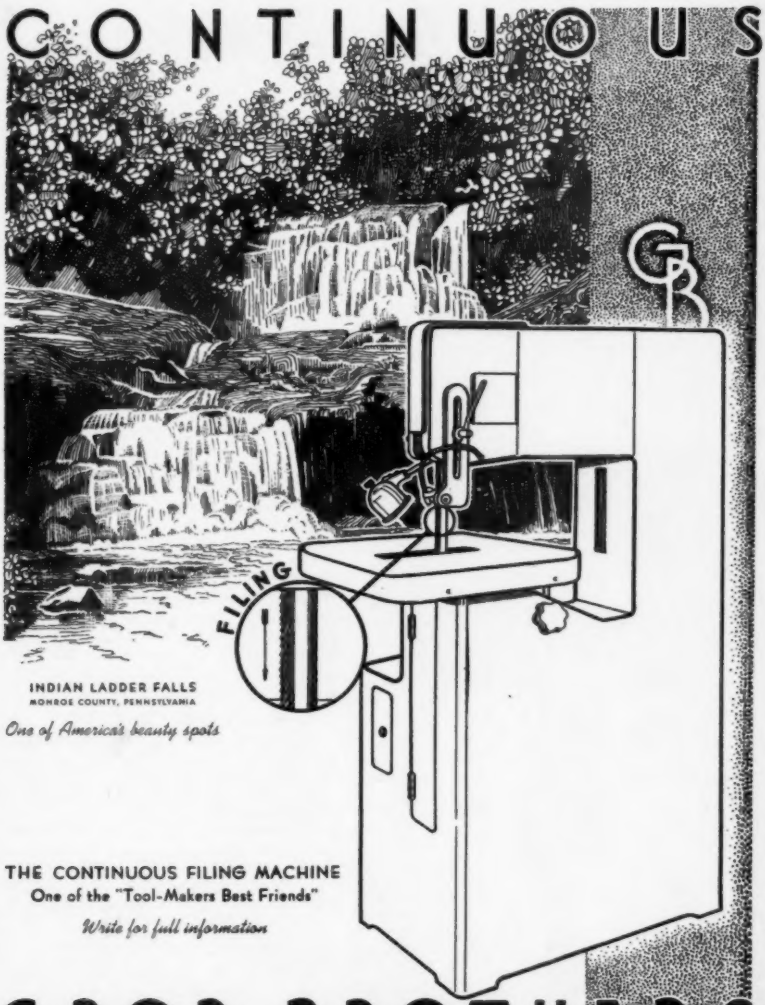
Who finds it pays?

These are some of the 845 companies that sent representatives to the national N. I. A. A. Conference last year . . . to take part in group discussions of marketing problems . . . present case studies . . . and study the advertising methods of industrial leaders.

You are invited to the 18th annual Conference of industrial sales promotion and advertising executives in Detroit next September . . . to get new ideas and information that will make your 1941 program more effective, more profitable. Write now for details.

18th Annual CONFERENCE *and Exposition*
National INDUSTRIAL ADVERTISERS *Association*
SEPT. 18, 19, 20 . . . DETROIT . . . HOTEL STATLER

CONTINUOUS



INDIAN LADDER FALLS
MONROE COUNTY, PENNSYLVANIA
One of America's beauty spots

THE CONTINUOUS FILING MACHINE
One of the "Tool-Makers Best Friends"
Write for full information

GROB BROTHERS
GRAFTON · WISCONSIN

"Reduces Tap Breakage"

... SAYS PLANT OFFICIAL

A prominent Ohio manufacturer writes: "On checking with our factory, I find the *Procunier High Speed Tapping Head with the Tru-Grip Tap Holder* is very satisfactory. It not only eliminates the necessity for using extension taps, which are more or less expensive, but it reduces tap breakage . . . and enables our workmen to produce more and better work . . . we are now able to discard our taps due to wear, rather than breakage." Some of the reasons back of this letter and hundreds of similar letters from enthusiastic users are: Tru-Grip tap holders weigh less than ⅓ the weight of conventional tap holders, and are more compact and accurate. Only Procunier High Speed Tapping Heads offer all these features: Dry, double-cone friction clutch that won't wear and can't absorb oil; makes bottom tapping easy; ball bearings; three point balanced, heat-treated gear reversing mechanism, which distributes pull and and greatly reduces strain — and other important features.

SEND FOR BULLETIN

giving full details, description and prices on complete line of Procunier Precision Tapping Heads to meet all needs, the new Tru-Grip Tap Holder—and also the full line of Procunier Universal Tapping Machines, hand, foot or air operated.

Procunier Safety Chuck Co.
14 So. Clinton St., Chicago, Illinois

Send me Bulletins on: ☐ *High Speed Tapping Heads* ☐ *Tru-Grip Tap Holders* ☐ *Universal Tapping Machines.*

Name .....

Address .....

City ..... *State* .....

PROCUNIER
SAFETY CHUCK CO. 14 S. Clinton St. Chicago, Illinois

NOW As Many Spindles As You Need

In ONE Low Cost Delta Unit

$983.50

8-Spindle 17" Drill Press Unit with No. 2 Morse Taper Spindles—complete with bench legs and table, but without motors.

With this new low-cost set-up, you can have just the number of spindles you need—one, two, three, six, eight—any number that meets your exact requirements. You can have any type of Delta 17" or 14" drill press heads—all 17"—all 14"—or any combination of both—spaced at any distance you desire, either close together or far apart.

This new development gives you an efficient continuous drilling and tapping production line, eliminating costly transferring from one drill press to another—and at the same time provides maximum working surface. Best of all, the cost of this new kind of set-up is a fraction of what special set-ups of this type formerly cost.

Built up of sectional tables, the table surface is 23⅜" by 125". Center to center between spindles is 15" maximum distance. Chuck to table 26". Quill has 5" stroke, drilling capacity is ¾" in cast iron.

For full details on this new "Tailor-made" drill press delevopment—write us today, telling how many drill press heads you could use on a set-up like this, whether you need 17" or 14" heads or a combination of both, and how far apart you want the heads placed. We will gladly send you complete specifications, prices and any other information you wish.

DELTA Mfg. Co.
INDUSTRIAL DIVISION
690 E. VIENNA AVE. MILWAUKEE, WIS.

Delta Mfg. Co.
690 E. Vienna Ave., Milwaukee, Wis.

Please send us without obligation full information on your new drill press development. We are interested in____drill presses on this set up,_____ ____17",____14", spaced_____inches apart.

Name .....
Address .....
City ..... State .....

STOP LOOK AND SAVE

with

RIGHT R AND LEFT L Turning Tools

Why ignore the savings that could be yours through the use of R & L Tools?

In first cost alone, there's a saving of at least $200 over the cost of separate tools required to perform the jobs that can be handled easily with one R & L.

Even more important are the operation savings . . . in time, effort and manipulation . . . and these mean more production and more profit.

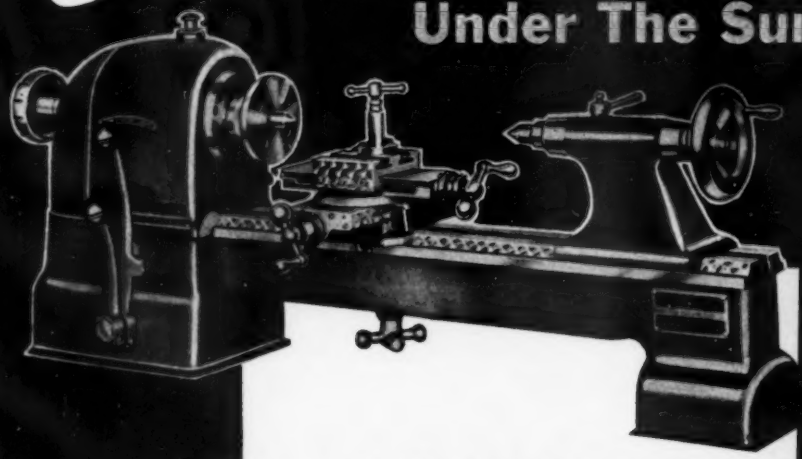
One R & L takes the place of at least seven separate tools, saving hours on set-up and operating time . . . saving through the multiple operation features which permit doing two or three jobs simultaneously . . . such as drilling, turning and burnishing at one operation.

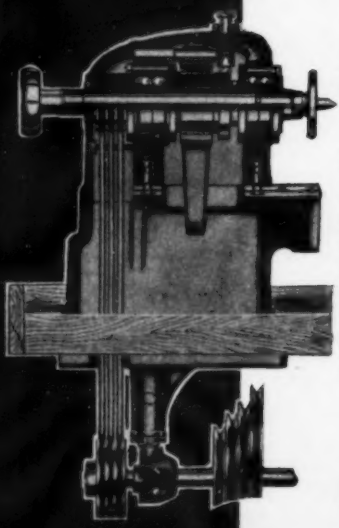
Then there's the important maintenance savings because R & L tools are simple and sturdy, with a minimum number of wearing parts.

Write TODAY for the full story of R & L savings.

R and L Tools
1825 Bristol St.
Nicetown, Philadelphia, Pa.

There Is *Something New* Under The Sui





The only High Speed Precision Bench Lathe on
market with the handy, quick belt change featu
No more annoying delays on important rush w
because of belt breakage. In less than five minu
the complete job of belt replacing is done.

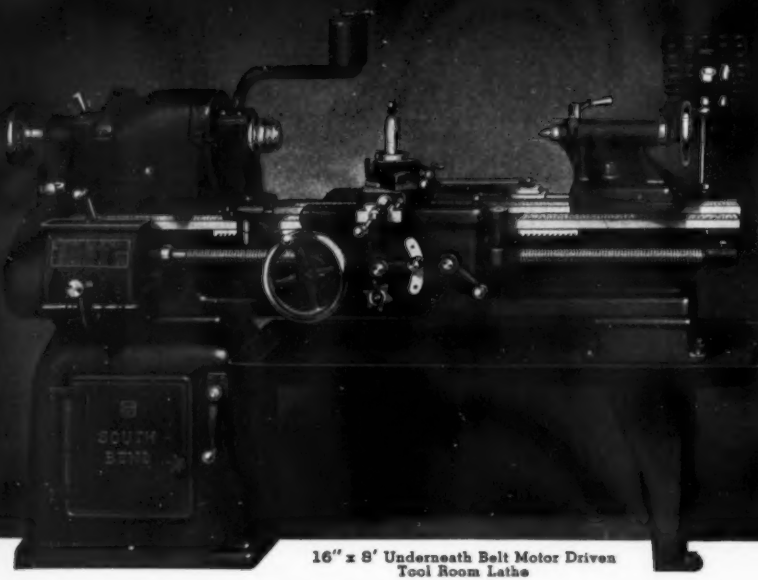
A rigid, sturdy, accurate lathe, engineered to m
the most exacting demands of any tool room. O
size Duplex Preloaded Ball Bearings are used
front and rear. The spindle is made from fi
Through Hardening Steel, S. A. E. (52100), gro
internally and externally. It is of a very rigid
sign, having extra large outside diameter. The e
heavy square lathe bed, and the Elgin Headst
are made from high grade cast iron, hand scra
to master gauges. There are other detail refineme
that assure sustained accuracy and superior
formance.

Elgin Lathes merit your investigation.
Write for complete details, TODAY!

ELGIN TOOL WORK

Division of Hardinge Manufacturing C

1772 Bertau at Ravenswood Ave., - Chicago,



16" x 8' Underneath Belt Motor Driven Tool Room Lathe

SOUTH BEND LATHES FOR PRECISION WORK

DOUBLE WALL APRON

Back view of the Double Wall Apron showing the rigid, one-piece box type construction that provides a substantial support for both ends of the gear shafts.

Gears in the apron are of steel and have a reservoir and felt wick automatic oiling system. Worm drive assures smooth operation of feeds on all classes of work.

South Bend Lathes have been giving thousands of users dependable service on the most exacting classes of precision machine work for more than thirty years. Sound design, the most expert workmanship and the best materials available are combined in South Bend Lathes to give them permanent accuracy and efficiency.

SIZES AND TYPES

Manufactured in 9", 10", 13", 14½" and 16" swing, bed lengths 3' to 12', in Motor Drive and Countershaft Drive. Attachments are available for production, tool room and general machine work.

New South Bend Lathe Catalog

Write today for a copy of our new 112-page lathe catalog describing all Sizes and Types of South Bend Lathes, chucks, tools and attachments.

SOUTH BEND LATHE WORKS

LATHE BUILDERS SINCE 1906

191 E. Madison St., South Bend, Ind., U.S.A.

The Editor's Page

THE big job ahead—safeguarding the Americas for Americans—will test our energy, skill and resourcefulness to the utmost.

Starting almost from scratch, we must pit our best against the threat of a war machine that has been making a regular business of conquest. Representing years of unremitting toil and self-denial, it is a cruel, heartless menace, flushed with easy victories, won largely through mass exploitation of many of the weapons we invented.

If we build quickly and well, our defenses may never be challenged. But if there is a lack of national unity—if we hesitate and fumble—if we waste time and money, our turn may be next.

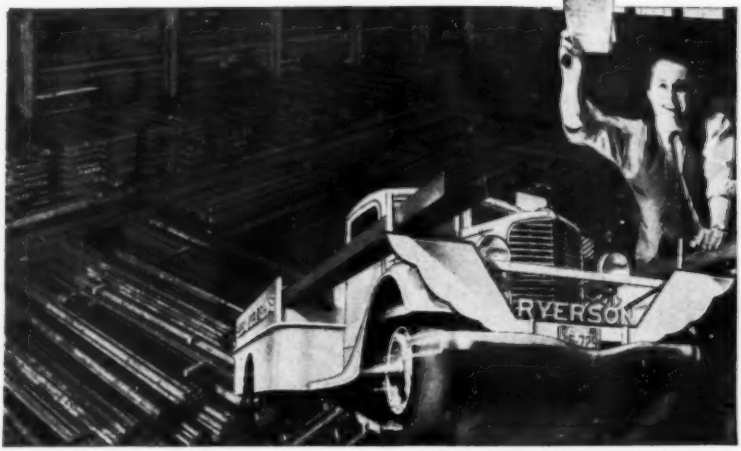
Our industrial machine can build safeguards that will make us secure from the ravages of war if we eliminate hysteria, politics and red tape. After all, mass production originated over here. Our manufacturers, who have surpassed the world in mass production for peace, certainly can excel the world in providing mass protection if we give them a real chance. We have the facilities and the directing genius — if they are unhampered.

It means more than the mere production of guns, ships and planes. It involves organizing and strengthening of our national economy all along the line.

It requires a healthy fiscal policy; rigid economy in non-defense expenditures; encouragement for new capital investment in new defense plants and equipment; cordial employer-employee relations and tireless vigilance against subversive elements which would undermine our Democratic institutions and destroy our American way of life.

Wesley G. Paulson

Steel for Defense . . .



is ready at RYERSON

Over the wires to ten great Ryerson plants comes ever-growing demands for steel to meet the strict requirements of America's defense program. Industry knows, from 98 years of experience, that Ryerson is a strong first line of support when good steel is needed quickly.

It's a matter of *seconds* from your plant to the Ryerson order department. A matter of *seconds* for you to tell Ryerson just what you want. And a matter of *seconds* for your order to be on its way in the Ryerson lightning-fast order handling system that gets steel shipped the day it's ordered.

Bars, plates, sheets, shapes, beams . . . stainless steels and alloys . . . 10,000 different kinds, sizes and shapes . . . all in stock for instant service! And all Ryerson Certified quality, your positive insurance against shop losses due to faulty steel. Ryerson Certified Steels are closely controlled as to chemical content, accuracy and finish, without the slightest increase in cost to you.

If you don't know Ryerson reliability, and if you're working on defense orders or other RUSH business, and you need steel, "Get in touch with Ryerson today!"

Write for Stock List.

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON CERTIFIED STEELS

RYERSON

Cutting the Cost of Cuts

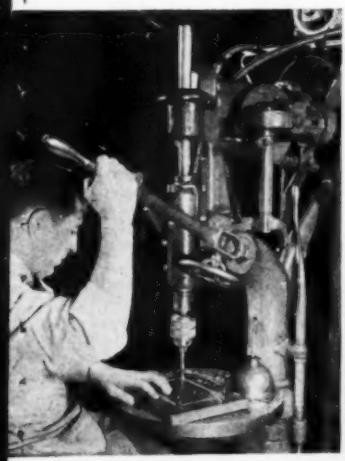
A Productive, Ultra-Modern Method of Stock-Removal Whereby What's Cut Off and What's Left Have Identical Material Value

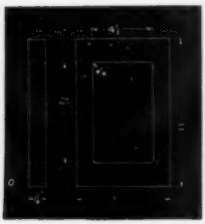
By H. J. CHAMBERLAND

GEORGE WASHINGTON told us plenty when he said: — "To Be Prepared for War is the Most Effectual Means of Preserving Peace." We have at last realized that no truer words ever were spoken, but, we are also well aware of the fact that the outcome of our tremendous National Defense Program, now on the march, depends to a major extent on machine tools, allied equipment and the men to whom these inseparables are entrusted. Due to standardization, simplification, the present and eventual availability to modern tools and their support from equally efficient production tactics, we should appreciate the magnitude of this task as compared to the predicament we were in for practically the duration of World War No. 1. However, we again face the problem of producing rapidly but this time, whether we make the lathe to turn the big gun or the gun itself, our own back-yards are at stake and accuracy, above all must predominate. Machine tool manufacturers have anticipated prevailing conditions for several years and their own preparedness program has now been in the making for some time past — they are ready. If the metal-working industry as a whole, absorbs the facilities now available and as quickly as they become so, I have reason to believe that this dreaded skilled and semi-skilled help situation will straighten itself out in much shorter time than now estimated.

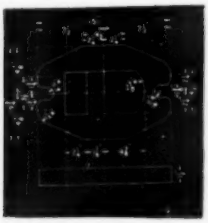
Metal-Cutting in the Foreground

Unless the clamps are put on wasted





Figures 1 and 2—At the left is shown a hard way of doing this particular job. At the right is revealed the modern way which makes it just a machine hand's job involving a small drill hole, 1/8" saw kerf and practically no waste—job completed in 24 minutes.



Figures 3 and 4—The die shoe gets the "hot seat" in torch cutting. In contrast by contour sawing, it's all over in a jiffy and the cut is as square as the square.

time and material, by some common-sense method of cutting and shaping, excessive manufacturing costs can, as a whole, be traced to stock removing operations. Even though considerable metal-cutting equipment of present-day design can well be termed as that of to-morrow, the fact remains that the efficiency of each and every machine must be kept constantly at par by feeding it the right fodder. It doesn't make sense to permit metal-cutting equipment, regularly or spasmodically, to reduce cubic inch after cubic inch of metal into worthless chips, when some other means will not only produce the cut in short order but leave the cut-out intact.

If production costs are to be held under control, necessarily they must be nipped in the bud and this is where the contour sawing machine does its stuff. Personally, I regard contour sawing as a dual transformation of time and material waste from hours into minutes and pounds into drams, respectively. Of utmost importance is the fact that besides incorporating accuracy, strength and versatility, the machine represents a triple alliance since it can be converted readily into a band filing or polishing machine. Therefore, the possibility of sawing, filing and polishing a part on the same unit with hardly any set-up time involved, is economy at its best.

Real Purpose of Contour Sawing Machine

It would not be doing justice to the metal - working industry, generally speaking, for any of us to assume that the contour sawing procedure was developed with the idea that it would eventually scrap all other metal-cutting methods. On the contrary, contour sawing equipment is a real asset to many a machine in any tool room or on any production floor. At any rate, it will prove itself so during this period of emergency. As I have previously stated, the time is at hand when all machining operations must be executed in the least possible time. We must bear in mind at this period that what we called precision in 1920 is today regarded as but semi-precision. In other words, we have discarded the magnifying glass for the microscope.

The real purpose of contour sawing technique is two-fold. First, to relieve other metal-removing machines of numerous tasks which heretofore they necessarily had to perform, regardless of labor and material costs involved. Contour sawing leaves the way open for such machines to accelerate production with operations where the nature of the work positively requires such procedures, with no other alternative in sight.

Secondly, when the contour sawing machine cannot by itself, act as a com-

bined roughing and finishing agent, it can still play the leading role as an ally and thus create a teamwork set-up whereby the saw will complete the job to the extent that the secondary or final step will be of minor consideration. During periods of industrial inactivity, several types of related machines would thus be on a short-time basis but this need not be feared for some time to come. When this does occur, contour equipment will have liquidated itself possibly two or three times over.

Contour Sawing Matured Rapidly

Originally designed for tool room purposes, for the economical production of dies within its range of applications, this machine has within few years earned a high place in the hit parade of modern production tools. This is indeed an achievement when we realize that it took the grinding machine 30 years to step from a mere precision purpose to a stock-hogging stage. Obviously, improvements in grinding wheels have made this possible, for in 1920 I would raise a row if a lathe hand left an extra .005" to grind off. In 1925, I witnessed the same grinding machine remove 1/8" stock in 50 seconds from a bronze cylindrical casting, 12"x1-1/4".

Improved alloy steels and heat treating technique are similarly responsible for bringing the contour sawing machine to the front so rapidly. The possibility of decreasing the widths of band saws to 3/32" and 1/16" has now increased the range of the machine many fold. The advantages of contour sawing in relation to die work are already well known. I am indeed sorry to have to disregard this end of it as there are so many other important applications to be considered.

However, let's briefly consider Figures 1 and 2, from whence we shall go on. A job like this one used to make me nervous but the company got the headache. I will admit that in such cases we did economize on material, but it took plenty of time to do it. Such work with the contour sawing machine is like "stealing candy from a child." You lay out the line, drill a small hole at one or each corner, cut the band saw, pass one end through one of the holes, a one-minute welding job, and you're all set. At the rate of 1" a minute on tool steel 1" thick, you keep cutting and before you know it the slug is sawed as close to the line as you wish, either straight or on an angle, as the table tilts in the four directions. Another jiffy set-up and you can go right on filing to requirements.

It, of course, makes sense that to attain the present standards of performance, contour sawing machines are designed to incorporate the accuracy of a precision bench lathe and the ruggedness of a substantially large milling machine. Added advantages, in addition to rapidity of cutting and material waste elimination, are quick set-ups, ease of operation, low saw cost due to continuous cutting action, the possibility of cutting to a height of 12", depending on the size of the machine and, of course, to generate complicated outlines or true circles, internally or externally. To the above, we must add the availability of increasing the strength of parts by substituting steel for cast iron. The following few requisites are imperative to support these advantages: — First, proper selection of the saw, in accordance with the material to be cut, bearing in mind such factors as width, temper, number of teeth and set. Second, efficiency from the correctly selected saw can only be expected if its operating speed in feet per minute is in relation to the nature of the cut.

Performance

Bragging about the pudding doesn't mean so much, and the reader expectantly feels by this time that he should get action. In recently conducted comparative tests with several other conventional methods of metal-cutting, the contour saw leads by considerably more than a nose. One may be inclined to assume that in a case of this kind, the manufacturer of the related equipment is likely to pick the whole slice and not the crumbs. The best way to convince this minority

group and render a service to the majority group, is to accompany such facts with facts and figures of past performances and possible accomplishments of identical nature. In no case will we attempt to rob any machine tool of its dues.

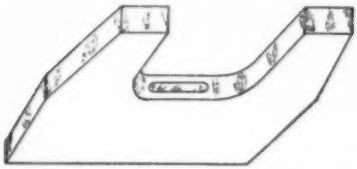


Fig. 5—Two parts sawed externally at the same time. Including the slots, the job required 25 minutes. Production by other methods required eight hours.

Torch Cutting

It is advisable first, to consider the torch, since this procedure also saves the material and therefore makes it a close competitor of contour sawing. The advantage of the torch lies in the fact that, similar to a tool post grinder, it can be moved to the job and there's no limit to the territory it can cover as it is carried along by hand or mechanically and the work remains stationary.

This procedure is most practical to cut large sheets, long pieces or irregular shapes, billets and castings of mild steel, etc. While the torch cuts very rapidly and has to some extent the material-saving gift of the contour saw, it doesn't completely fill the bill for tool work and related parts production because the resulting finish requires an extra operation. As shown in Figure 3, burning is the big disadvantage of "torch" cutting. Nothing like this can happen with contour sawing, Figure 4, which results in a nice clean cut, accurately square, with less than a $\frac{1}{64}$" kerf. The savings in material in favor of the saw for cutting 25 linear feet of 1" thicknesses would even in this case be about 1½ lbs. It is not considered practical to cut carbon tool steel with the torch, much less high-speed steel and other tough alloy steels. The contour saw has a top-to-bottom accuracy of within .002" for a height of 8", a feat that cannot be duplicated by the "tops" torch cutting expert. The saw leads again to the extent that the torch will not cut brass, copper, aluminum and many other non-ferrous metals. Neither will it cut fibre, hard rubber, bakelite or any other moulded plastics now industrially used. The torch could well shape the part shown in Figure 5, even if the outside cut had to be retouched. But what about that slot in the center? The contour saw will handle jobs like this one, day in and day out.

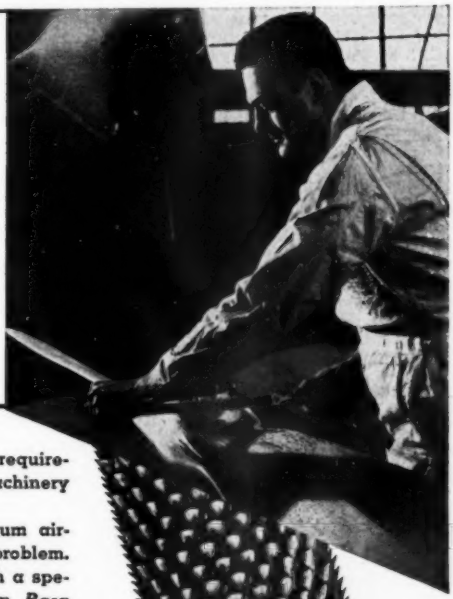
The Lathe

You cannot turn a plug gage on the contour sawing machine but neither can you bore two 12" holes in a 30" plate with the average size lathe.

By evolutional stages, dating back from candle-light days to what it is today, the lathe is and will remain one

Fig. 6 and 7 shows a job that is a sticker for the average size lathe. With the saw it is a quick and easy way.

IN STEP WITH PROGRESS



NO INDUSTRY presents more new requirements calling for ingenuity in machinery and tools than aviation.

A company producing aluminum airplane propellers ran into a filing problem. Nicholson helped to solve it—with a special 16-inch half-round Aluminum *Rasp* that's a speed-demon on "roughing-down" work . . . after which the Nicholson special-cut Aluminum "A" *File* and finer-cut regular files are used for finishing.

Nicholson, producing more than 3000 file shapes, sizes and cuts, is the world's largest and most completely equipped file manufacturer. When you choose Nicholson or Black Diamond files you get *quality* files — *uniform* files — *correct* files for the job . . . plus the privilege of calling on *file experts* whenever Progress hands you a new filing problem.

NICHOLSON FILE CO., PROVIDENCE, R. I., U. S. A.
(Also Canadian Plant, Port Hope, Ont.)

NEW NICHOLSON 16-INCH HALF-ROUND ALUMINUM RASP

NICHOLSON FILES

FOR EVERY PURPOSE

of our most important machine tools. But the fact remains that, through no fault of its own, it has been responsible for mountains of waste material and barrels of dollars in excessive labor costs. This statement applies as well to any other equipment used in the removing of metal by rotary or stroke motion. Of course, the lathe has its regular duties to perform as we must use it to drill, bore, face, thread, form, etc. Still, jobs come along which no available lathe can handle, regardless. Other jobs appear and are of such a nature that it is a mechanical mistake to proceed in the lathe, when so much time and material could well be saved by some more up-to-date procedure.

As a comparative example, let's refer to Figure 6. Here is a job represented by a plate 30"x1¼", into which must be bored two 30" holes. This particular size lathe could not be used unless the plate were cut in two. It took a good man 3 hours to true each piece and bore the holes. Here, one would be out of luck if both holes necessarily had to be bored in a single part.

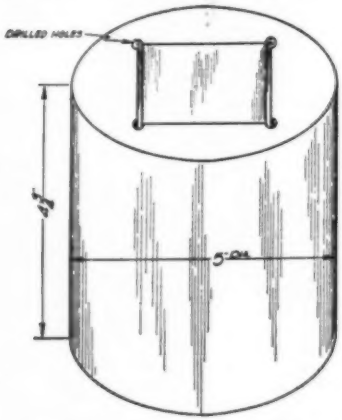
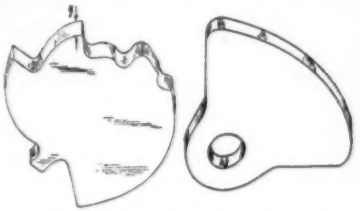


Fig. 6—Cut from SAE—6145 Tool Steel. Former production time was 6 hours. It was contour sawed in 55 minutes.

Contour sawing solved this problem most economically, as shown in Figure 7, by means of a disc-cutting attachment, having an internal or external capacity up to a 30" circle. A ¼" centering drill is used to provide the work center. The center in the attachment is also of ¼" centering drill size and thus pivoted on this center, the work is revolved into the saw. This pivot is adjustable and since it is not limited by throat depth, true circles to the capacity of the machine are available. The results of a clean and narrow slit, are true circles and no waste with minimum set-up time.



Figures 9 and 10—Left cam was cut from 5/16" C.R. Steel by former methods in 7 hours. It was contour-sawed in 4½ minutes and band-filed in 5 minutes. Right hand cam was cut from ⅝" C. R. steel in 4 hours contrasted with contour sawing in 9 minutes.

Figure 8 shows another interesting job. This part is a coupling for a rolling mill and the material is tool steel, S. A. E. 6145. Any toolmaker knows what he's up against to produce this square hole by ordinary means. Drilling, boring, a tedious operation shaping corners, and plenty of filing is what it amounts to.

Including the time to drill the four holes, the contour sawing procedure saved five hours' time and seven pounds of material on this one job. Just imagine what tools can be made from a slug that size. Wouldn't grandpa blink if he had seen this happen, even 10 years ago?

Cams. Oh yes, they look nice when completed, but not so easy to machine, I mean once upon a time. Cutting a cam in a lathe involves a master cam and a costly set-up. It is not so bad with a cam of the design shown in Fig-

Most golfers have one, but—it isn't golf we're driving at—it's power drives like those listed at the left. S. S. WHITE Flexible Shafts of the Power Drive type will solve them—simply, effectively, economically. **BULLETIN 1238** brings you all the "dope" about **power drive** shafts. Write for copy.

A FEW APPLICATIONS OF S. S. WHITE FLEXIBLE SHAFTS

POWER DRIVES

Instruments
Counters
Indicators
Speedometers
Tachometers
Taximeters

General
Air Conditioners
Aircraft Fuel Pumps
Bottling Equipment
Business Machines
Concrete Surfacers
Concrete Vibrators
Cotton Pickers
Engraving Machines
Flame Cutting Machines
Food Handling Machines
Hair Clippers
Home Workshops
Kitchen Appliances
Massage Machines
Mechanical Toys
Portable Tools
Screw and Nut Setters
Shoe Machinery
Tube Cleaners
Valve Grinders
Washing Machines
Windshield Wipers

REMOTE CONTROLS

Automotive
Antenna Control
Choke and Needle Valve Adjustment
Clock Setting
Engine Governor Control
Gear Shift Control
Radio Receivers
Trip Mileage Reset

Aircraft
Antenna Reel Control
Beacon Receivers
Compass Loop Control
Gyro Pilot Control
Heating Register Control
Radio Receivers
Tab Control
Variable Pitch Propeller

General
Cam Position Indicator
Centralized Machine Controls
Electrical Switches
Gun Fire Controls
OvenThermostat Controls
Valve Position Indicator
Washstand Drain Control
Weighing Balance Accurate Adjustment

Or maybe your problem

***is* REMOTE CONTROL**

If so, you will find a ready solution in S. S. WHITE Flexible Shafts of the Remote Control type. Note the remote control applications in the list—They may give you ideas for possible uses in your own products. **BULLETIN 38** brings you full details about **remote control** shafts. Write for a copy.

ENGINEERING COOPERATION always available for working out specific applications.

S. S. WHITE

The S. S. White Dental Mfg. Co.
INDUSTRIAL DIVISION
Dept. H, 10 East 40th St., New York, N. Y.

FLEXIBLE SHAFTS for POWER DRIVES, REMOTE CONTROL and COUPLING

ure 9, but the milling machine would be best to generate a shape of the cam in Figure 10 and this costs plenty. These two parts were no "stickers" for the contour sawing machine and please note the respective times actually required.

Reciprocating Machines

The shaper, like the hack saw, actually cuts but 30 minutes for every hour the ram is in motion. Actually it is something of a small planer. It is another of our basic mediums for removing metal and it has its own functions to perform. With no contour sawing equipment available, a considerable amount of work must contact the shaper with considerable waste of material and high labor costs. There is always sufficient work for a shaper to do in the way of surfacing, squaring or removing a minimum amount of stock to obtain a certain shape or outline. This is particularly true in a large plant. On the other hand and due to low tooling cost, a small plant has ample use for the shaper because it is an economical procedure for small-lot production.

In recent years, some shapers have been developed for a maximum stroke of 30", so the longer the stroke, the more time lost due to the non-productive return strokes. It is therefore obvious that since contour sawing permits cutting to a height of 12", depending on size of equipment, it has an extensive range.

A shape cut on a shaper is not a finished shape because curvatures cannot be navigated easily. A shape must be derived by succeeding cuts controlled in two planes as best can be done. While angular adjustments allow for clean and true cuts, contours must be left in a rather rough state and as a whole, this procedure involves a jig-filing or hand-filing operation for final results.

What applies to the horizontal type shaper, also applies to the vertical type equipment. The vertical shaper is as useful as its brother tool and it also has similar performance characteristics.

With contour sawing, one has full control to follow a layout line of the most complicated shape, either internally or externally. The cut is clean, square, with less than $\frac{1}{16}$" saw kerf—a one-piece slug, no waste, plus an important saving in time in many cases. With the contour sawing machine, it is no problem to cut within .003" to .005" of the line and in jack-rabbit time, change over to the band file and complete the cut.

The contour saw has proved economical in the making of forming tools due to the fact that 75% of the forming tools are ground all over after hardening. The cost of these items is cut to a frazzle because the form is made ready right from the saw, by making necessary allowances for grinding.

Figs. 11, 12, 13 & 14 respectively, prove that the contour saw can well substitute for or supplement machine tools for a vast amount of work in any shop. As finished in a shaper, Figure 11, the part had been previously rough-shaped from the slab and we know what that means. A similar part

Figures 11 and 12—A long job—or a 30-minute operation the new way, plus a smile.

HOW THIS NEW "2 in 1" WELDING SERVICE SAVES US MONEY

● "Look, Bill, this new welder gives us the arc potency to suit any job — from 200 down to 15 amps.—with this one simple adjustment."

● "For bigger jobs or peak loads requiring greater amperage, machines stacked this way are connected in parallel. This multiple shifter sets current on both machines at once."

● "To disconnect, just unhook these paralleling elements. Next, release the multiple shifter so current settings can be made separately on each machine."

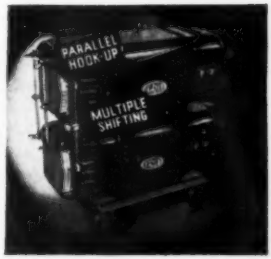
● "Now, we have *separate* 200-amp. services for two operators . . . to handle the general run of our welding work. We keep the machines busy."

● "That's great, Joe! It must cut the tax out of your welding costs." "I'll say it does!—and reduces our investment in equipment, too!"

P&H-HANSEN
SQUARE FRAME WELDERS

Never before such a welder! Less than a yard long and a foot high—yet it gives you the finest known arc characteristics all the way up and down the range—from 200 down to 15 amps!... It's easier to use. With single current control you have only one indicator to set. Response is automatic for desired arc length under all welding conditions. No other welder permits this simple paralleling arrangement. It enables you to use machines individually on the ordinary run of work yet combine the capacities of two or more machines for high amperage jobs.

Cut your welding costs!... eliminate the need for special amperage machines. Ask us to send you Bulletin W-28. Bulletin W-26 covers the Square Frame Welder with a range from 260 down to 30 amps.



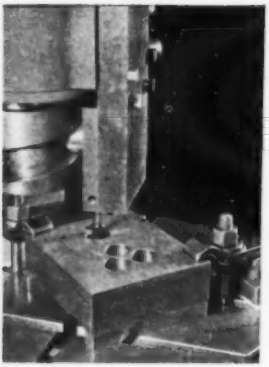
SMOOTHARC
WELDING ELECTRODES
Always "Factory Fresh" in Air-Tight Containers

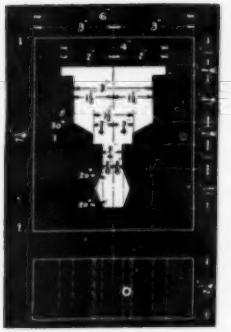
Users like this dependable source of supply—dependable because: (1) Smootharc electrodes are made in one of America's best equipped plants where large scale production assures capacity for prompt delivery. (2) Modern methods provide the utmost in quality control. Packed immediately in air-tight metal containers, Smootharc electrodes are protected against moisture absorption and spoilage. They are "factory fresh" whether you use them next week or next year. Because you can store them for long periods, you can buy them in quantities, at quantity prices . . . Write for literature.

General Offices: **4578 W. National Avenue, Milwaukee, Wisconsin**

HARNISCHFEGER
CORPORATION

ARC WELDERS • EXCAVATORS • ELECTRIC CRANES P&H MOTORS • HOISTS • WELDING ELECTRODES





Figures 13 and 14—Give the vertical shaper a break—but not this way. On the other hand, the saw is in the die—the man has the punch. That's contour sawing.

was completed by sawing directly from the slab in ⅛th of the time and your vest pocket can hold the sawings.

Going from external to internal shaping, note what the vertical shaper, Figure 13, has to do to the slug removed by contour sawing, Figure 14, in an attempt to duplicate the shape at higher cost. A glance at Figure 15 will give the reader an idea what waste really amounts to when a job like this is done in a shaper.

Nibbling

The "nibbler" is not so common a machine tool in the average machine shop as a lathe, a drill press or a shaper, but it is however, a valuable tool in plants where thin plate stock or sheet metal is frequently shaped and accuracy is a secondary consideration. Nibbling can be called a midget punch and die operation. The machine has no table, the blows come fast enough and the operator has his hands full as he guides the part being shaped.

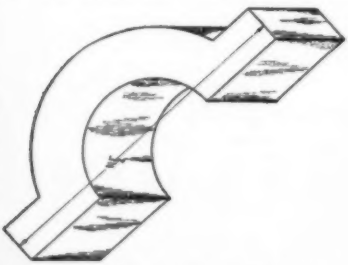


Fig. 15—Material, 2½" machine steel. Former time, 4 hours. Sawed in one hour 20 minutes.

The nibbler, like the vertical shaper, cuts only on the downward stroke and thus is also a time-killer insofar as return strokes are concerned. It duplicates the drilling method for starting internal outlines by punching holes in sheet stock for the same purpose. The material waste far exceeds the drill-chisel idea and the finish of cut and accuracy must be obtained by filing.

As a result of contour sawing technique, the nibbler must yield for the same reason the drill-chisel jig-saw method had to in connection with die work and other heavier parts. As much as we regret that a new development robs a certain good machine tool of some of its efficiency, this is no sign the latter has become useless and is a "'white elephant." It is well to remember that while only machine tools can reproduce themselves, a recent nation-wide check-up tells us that a surprising number of our machines in use, are no less than 10 years' old and therefore antiquated from a point of view of design, if not wear.

The making of templates is a job that always demanded considerable skill, before the contour saw stepped in, but is now considered an apprentice's job if done the modern way. Shown in Figure 16 is a frame-like part used as a comparative test job. It's a long

Get the most

FROM YOUR END MILLS AND MILLING MACHINES . . . WITH A MILWAUKEE MIDGETMILL

THE Milwaukee Midgetmill is specially designed to get the most from end mills and milling machines by providing the correct high speeds that mean smooth, clean, accurate work and long tool life. Adaptable to any milling machine — completely universal —mills, drills and bores—fast, safe and easy to set up.

KEARNEY & TRECKER CORPORATION
MILWAUKEE, WISCONSIN

The "THOU-METER"

—exclusive with the Milwaukee Midgetmill. Set cutting tools by direct reading —merely touch tool to work, set dial at zero, and mill, drill and bore until dial shows correct reading—in thousandths. No graduations—no dials—no stops—no binding screws. Accurate to plus or minus .00025 inch in its 2½ inches of travel.

The MILWAUKEE SPEEDMILL

— for end mill speeds up to 5200 r. p. m. Accurate, easy to operate, improved finishes. Adapted to all types of milling machines.

Write now for complete information on the MILWAUKEE MIDGETMILL and SPEEDMILL—built to the same quality standards as Milwaukee Milling Machines.

Products of

KEARNEY & TRECKER CORPORATION
MILWAUKEE MILLING MACHINES

Fig. 16—Nibbling is costly on this job because it involves a yard of filing.

and tedious operation by punch-and-die action to cover approximately 32½ linear inches of territory. To this must be added the extra cost of jig-filling, which is also a single-cycle method of removing metal.

In Figure 17 is shown a finished duplicate of the part in an upright position on the table of the contour sawing machine. The related caption tells the

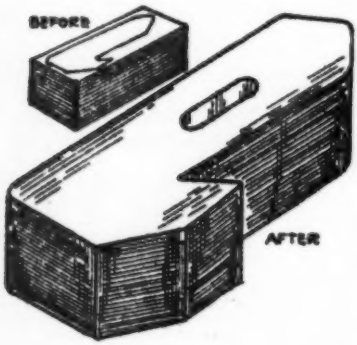


Fig. 18—This shows where contour sawing downs short-run production costs from dollars to cents.

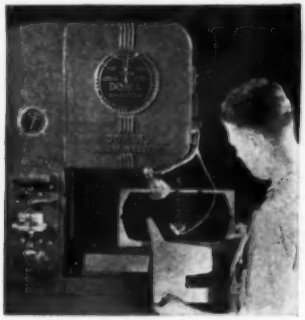


Fig. 17—Toolmakers like this way because in a few minutes the job is clean-ready.

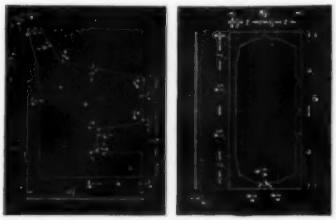


Fig. 16-17-A—Details of the template jobs.

results of this test. Note the external shape.

Stack Sawing

Stack - cutting is but one of the money-saving features of the contour saw. Parts stacked up to height capacity of the machine can be sawed as a single piece. This procedure is very simple. The parts are firmly pressed together, either in a vise or arbor press and the assembly is soldered at as many points as deemed necessary. Sweat - soldering is suitable for thin stock; heavy stock should be arc-welded to produce a stronger bond. Figure 18 is an impressive example of stack-sawing.

NOTE—Part II of this interesting story on Contour Sawing will appear in the September issue.

"RAPID ACTION! YOU GET IT WITH THIS ELMES HIGH SPEED FORMING AND DRAWING PRESS"

PRODUCTION

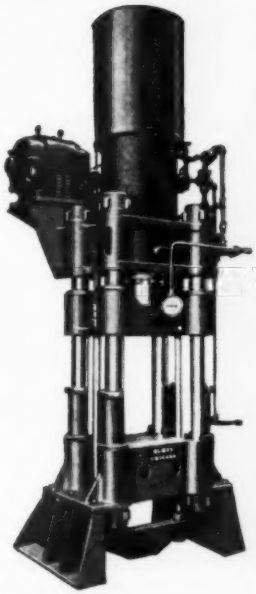
Present day requirements call for high speed press equipment. This drawing and forming press is qualified to give the maximum production with economical operation.

SPEED

This press is exceptionally fast, utilizing a rapid advance and return speed to minimize the idle stroke. The drawing speed can be adjusted to suit any requirements up to the maximum.

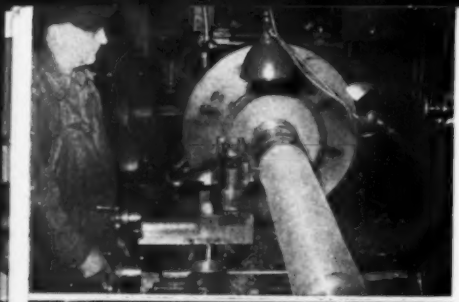
FEATURES

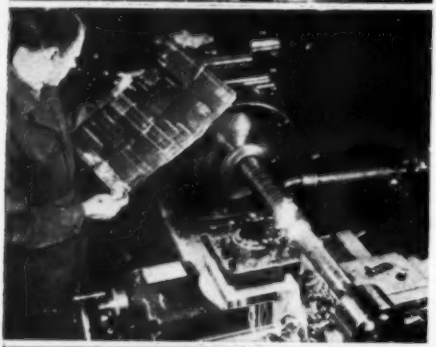
- Automatic controls are accurate and respond instantly.
- Pressure adjustments easily made and closely controlled.
- Ease of operation.
- Quality production.
- Available with cushion or automatic ejector.
- Complete range of sizes available.

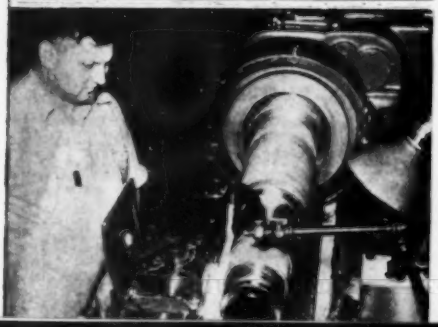


WRITE FOR COMPLETE INFORMATION
Also Manufactured in Canada
WILLIAMS & WILSON, Ltd., Distributors

CHARLES F. **ELMES** ENGINEERING WORKS
244 N. MORGAN ST. *Chicago* . . . SINCE 1851 . . .







Stepping Up

THE machine tool industry is exerting every effort to speed-up production to meet the many demands.

Figures gathered in recent weeks from major producers, indicate numerous instances where capacity has been increased from 30 to 50% through use of Carbide tools, according to a survey by Carboloy Co., Inc., Detroit.

Many of these typical steel cutting operations are directly applicable in production of analogous parts in general industry

Fig. 1. (upper left) A 55-⅛" long, 6-½" diameter, 1045 hot-rolled spindle shaft with a 2-⅝" x 13-¾" diameter flange being turned at Gisholt. Carbide tools stepped up cutting speed from 100 to 250 feet per minute. Feed is .025" with ⅛" to ¼" depth of cut. Incidentally the tools on this operation are said to cut all day without resharpening. A Monarch geared headstock engine lathe is used.

Fig. 2. An increase of nearly 300% in machining capacity was obtained by Monarch on this set-up for machining S. A. E. 2350 lower gear box shafts.

Fig. 3. Gisholt reports an overall increase of 30% in production through the use of carbide tools, turning, facing, boring and counterboring an S. A. E. 1045 hot-rolled intermediate gear on a Gisholt turret lathe.

Fig. 4. Production capacity of hand forged spindles by Warner & Swasey was more than doubled. Of S. A. E. 1050 steel, these took 5 hours to rough and finish machine with high speed tools, 2.2 hours with tantalum-titanium carbides. Cut is ¾" to ½" with a .0167" feed at 175 surface feet per minute for roughing. Finishing is at 210 feet per minute with a .021" feed and ⅛" depth of cut.

Fig. 5 (center) Machining tool post

Production

carriages in gangs of six on a new type Rockford hydraulic planer at Gisholt. Cutting speed has been stepped up from the old rate of 65-80 feet per minute and .020" feed, to 150 feet per minute with a feed of from .035" to .040". Maximum depth of cut is ⅝". Operation consists of planing nine surfaces on bottoms of the carriages. Incidentally Gisholt reports that tools are sharpened now only every 3 to 5 days as against every 2 to 3 hours with high speed steel.

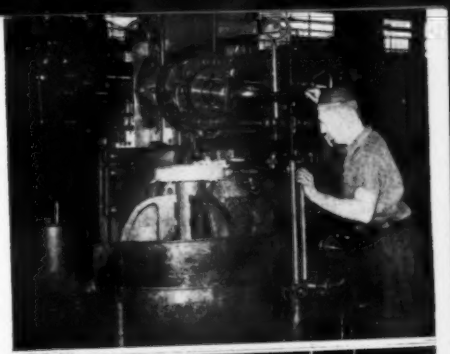
Fig. 6. (center) Cutting time on S. A. E. 1045 spindles was reduced from 55 minutes to 18 minutes by Bullard. Operations included:—facing, turning and undercutting. Cutting speed 282 feet per minute, with .018" feed and 1/32" to 5/16" depth of cut.

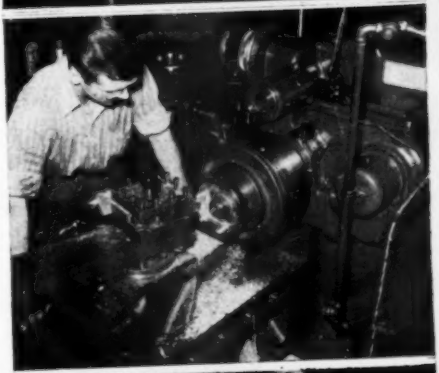
Fig. 7. (upper right) Lower internal shaft for Monarch lathe. S. A. E. 2350 steel. Cutting time reduced from 15.2 to 2.6 minutes—a decrease in machining time of 83%. Tantalum carbide tools were used. Cutting speed 247 feet per minute with 0.27" feed and ½" depth of cut, maximum. Total metal removal is over 15 pounds.

Fig. 8. A tough-machining job on Ampco No. 18 bronze at Gisholt, rough and finish taper boring worm wheels. Better than 220 feet per minute with .018" feed. Operation performed on a Gisholt turret lathe with two tools, roughing and finishing.

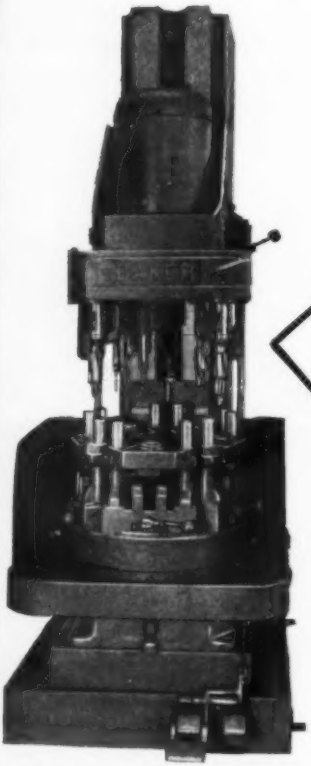
Fig. 9. A reduction of 13 minutes per piece in cutting time was accomplished by Warner & Swasey on S. A. E. 2315 idler shafts. Cutting speed is 245 feet per minute with a .015 feed.

Fig. 10. Tooling with carbides for small production lots is not so much of a problem as might be thought. The group of tool types shown (lower right) covers 80% of the machining requirements at Gisholt. A few of these types are fitted with different grades of tips to take care of requirements. Two "universal" grades—one for steel cutting and one for cast iron, etc.—are principally used.





A PENNY SAVED IS A PENNY EARNED...



IT IS THE VALUABLE SECONDS SAVED IN LOADING AND UNLOADING THE FIXTURES THAT COUNT IN PRODUCTION.

•

FIVE ESCO FIXTURES MOUNTED ON INDEX TABLE FOR DRILLING, FACING & C BORING WHEEL HUBS

•

CONSULT US ABOUT YOUR TOOLING AND PRODUCTION REQUIREMENTS WITHOUT OBLIGATION.

•

ESCO ENGINEERING & SALES, INC.

4855 FOURTH AVE., - - - - DETROIT, MICH.

MF'R OF

ESCO DRILL JIGS

Extra

CANEDY-OTTO Announces New

6 Spindle Drilling Unit

Meet the increasing production schedules with this time saving precision drilling unit. Designed and engineered to do the greatest amount of work in the least possible time.

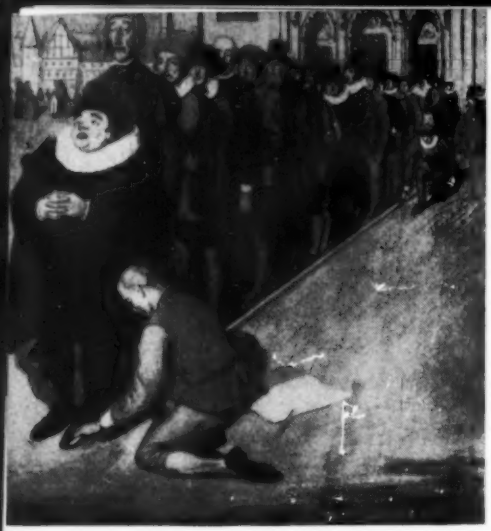
Full ball and roller bearing. Each head individually driven and controlled, with a separate geared power feed and eight spindle speeds—four by means of open belt and four through back gear concealed in spindle column. Eight-step sheave type pulleys are available, giving 16 spindle speeds. The base contains oil sump for wet drilling.

Feeds are .003, 005, .007 and .010. Taper hole in spindle, No. 4 Morse.

Capacity with back gear is 1½" in cast iron. Without back gear, 1". Spindle travel with power feed is 9¼". Smallest distance between spindle and gib is 10½". Working surface of table is 24"x119". Maximum distance between spindle and table is 22". Vertical travel of table is 11". Distance between centers is 19". Total height with spindle up to 104". Height of base 10". Overall dimensions of base are 54" x135". Net weight is 12,000 lbs. *It will pay you to investigate this efficient, modern unit today.*

CANEDY-OTTO MFG. CO.

CHICAGO HEIGHTS, ILLINOIS



How Long

The Historical Our Standards and of

THE ROD

THE LENGTH of the left feet of 16 men, lined up as they left church on a Sunday morning was the lawful rod in the 16th century. Standards for measuring length originated naturally from parts of the body. Fingernails, fingers, feet, arms, all became units of length.

The length of the forearm from elbow to middle finger tip was the ancient Sumerian and Egyptian unit of measurement, called the "Cubit", the symbol of which was the figure of a forearm. There were various cubits differing somewhat in length, but two were of outstanding importance—the Royal Egyptian Cubit averaging 20.62 inches and the Olympic Cubit of 18.24 inches, of which there is now no known specimen, but its length was recovered from measurements of the Greek Parthenon.

Col. Belaiew, the Russian metrologist, has shown the relationship between the two cubits, i. e., "the area of a square on the Olympic Cubic equals that of a circle whose diameter is the Royal Egyptian Cubit."

THE CUBIT

The Olympic Cubit was subdivided into two spans (of about nine inches), six palms (three inches), 24 digits (¾ inch).

At a later date, two-thirds of the Olympic Cubit became the "Foot," which was subdivided by the Greeks into 12 thumbnail breadths.

Is A Rod?

Origin of of Length Measurement

THE PALM

The foot unit passed to Rome, and so to Britain where its division of twelfths or "unciae" became inches. In Britain the Roman foot became merged with the Anglo-Saxon measures which also contained the Fathom or length across the two arms outstretched, equal to four cubits or six feet. Under the Norman kings, half-a-fathom or one arm outstretched from the middle of the body was found to be a more convenient length, particularly for measuring cloth, the most important trade of the time.

THE DIGIT

Thus, the Yard of three feet arose, and a bronze yard bar was kept as the Standard of Reference in the King's Exchequer, first at Winchester, and later at Westminster. Very few of these old Exchequer standards have survived. Queen Elizabeth's Yard remained the standard from 1558 to 1824 when it was superseded by Bird's Standard Yard of 1760 which was destroyed by the fire at the Houses of Parliament in 1834.

When the new imperial standards to replace them were completed in 1855, two copies of the yard were presented to the United States, arriving in this country in 1856. Later these copies were compared with the accepted 36 inches of the Troughton scale and finally

they were accepted by the Office of Weights and Measures as the standards of the United States. On July 28, 1866, Congress passed the act legalizing the metric system, as the standard for the United States.

A Cubit—the first known measurement, was the length of a forearm from point of elbow to end of the middle finger, or about 20 inches.

The Digit was the breadth of a finger, or from .72 to .75 inch.

The Palm — width across an open hand at base of fingers—measured about three inches.

In 1324, Edward II decreed that three barley corns taken from the center of the ear, placed end to end, equalled an inch—a foot ranged from 9¾ to 19 inches. Henry I decreed the distance from the point of his nose to the end of his thumb was the lawful yard.

In 1851, Sir Jos. Whitworth invented the first measuring machine using end standards, and capable of detecting differences of one millionth of one inch.

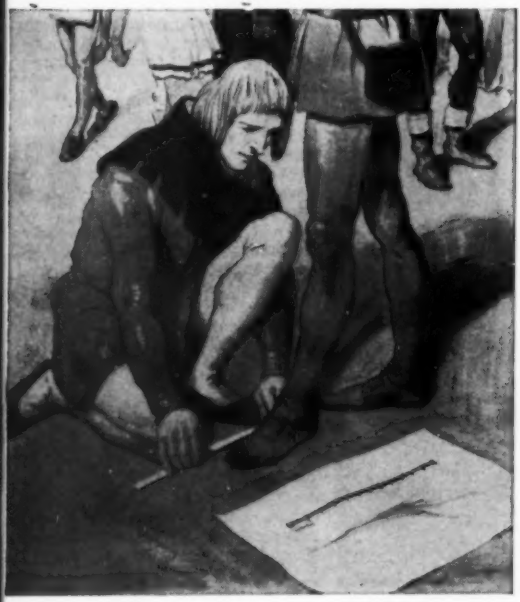
The first and original Vernier Caliper, as far as is known, was invented by Jos. R. Brown in the same year. One thousandth of an inch could be measured with this instrument.

The Systeme Palmer Micrometer Caliper, patented in France in 1848, was the forerunner of the micrometer Sheet Metal Gage made by Brown and Sharpe in 1867.

In 1882 came the Rogers-Bond Universal Comparator used for the transfer and comparison of line measure standards.

The first set of Johansson Gage Blocks—now the "World's Standard of Measurement"—was produced in 1896 at Eskilstuna, Sweden.

Until a few years ago, international industries were handicapped by use of the English System of measuring in some countries and the Metric in others. For a long time the Ford Motor Co., sought a practical ratio between the two systems that could be established throughout the world, without necessitating expensive and slow changes of the accepted systems of measuring.



In 1923, Mr. Ford acquired the manufacturing rights for Johansson Gage Blocks in the Western Hemisphere. Experiments were continued at the Ford laboratories in Dearborn, until they were developed to measure within one-millionth of an inch.

Because of this new standard of accuracy, the Ford Motor Co., was able to establish 25.4 millimeters instead of the actual figure of 25.4001 as the equivalent of one inch. The slight difference be-

CUSHMAN Leads . . .

with . . .

- **STATIC BALANCE** of Chucks for use on all new type taper spindles.
- **CHUCKS** are tested for balance, as shown in this photograph, on standard Gisholt Static Balancing Machines which permit balancing accuracy within 2 oz-inches.

ASK YOUR LOCAL DISTRIBUTOR . . . HE KNOWS

A WORLD STANDARD for PRECISION *Since* 1862

Photograph taken in the Cushman Plant shows Chuck on Gisholt Static Balancer. Operator checks against close limits for static balance in all positions.

Watch for our NEXT advertisement which will present another important Cushman development in modern Precision Chucking.

Static Balance of Chucks is just one of the many additional precision features now offered by Cushman at no extra cost to chuck users. It means smoother operation and greater machining accuracy on any turning job. It becomes essential at higher spindle speeds and heavy feeds on latest type high production machine tools.

For the best in modern chuck design and performance, buy by the name . . . specify CUSHMAN Chucks.

THE CUSHMAN CHUCK COMPANY, HARTFORD, CONN.

Representatives in NEW YORK · CHICAGO · PHILADELPHIA · ST. LOUIS · SAN FRANCISCO · RUTHERFORD, N. J.
Sold in Canada by Canadian Fairbanks Morse Co., Ltd.

CUSHMAN CHUCKS

A WORLD STANDARD for PRECISION

THE YARD

tween the two figures amounts to less than one-quarter inch in one mile. For manufacturing purposes the 25.4 millimeter standard proved to be the acceptable bridge between the English and the Metric Systems. Industrial tolerances can be held to within one one-hundredth-thousandth of an inch in both systems.

Before this ratio was accepted internationally, it was necessary to get leading nations to agree to a temperature at which precision measurements would be made. This was established at 20° C., or 68° F. Johansson Gage Blocks measure with greatest accuracy at this temperature. The ratio of 25.4 millimeters to one inch at 20° C., has now been accepted by all the leading countries.

One millionth part of an inch is to one inch as one inch is to 15.78 miles.

One millionth (.000001") part of an inch is 3000 times finer than a human hair, which is approximately three thousandths (.003") of an inch thick.

The Gage Maker works to an accuracy of one tenthousandth (.0001") part of an inch, but this is 100 times greater than one millionth (.000001") of an inch.

WHAT IS ONE-MILLIONTH OF AN INCH?

The average newspaper is printed on paper that is approximately three thousandths (.003") of an inch thick, and this is three thousand times greater than one millionth (.000001") of an inch.

One millionth (.000001") part of an inch is to one inch as one - sixteenth (1/16") part of an inch is to one mile.

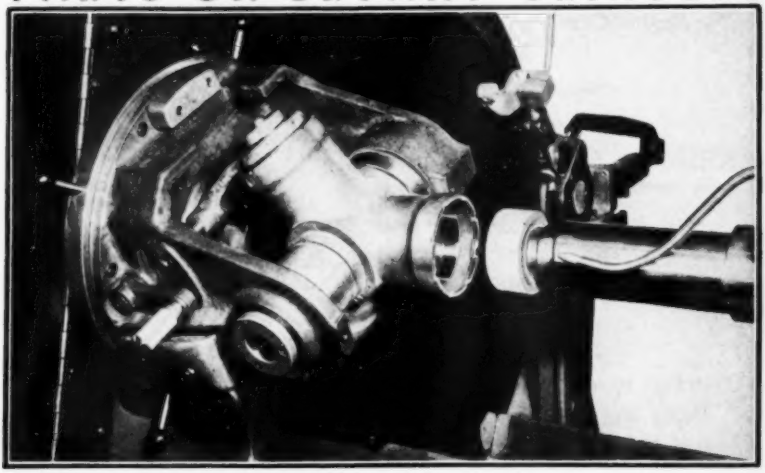
One millionth (.000001") part of an inch is to a human hair as a human hair is to 9 inches.

One millionth (.000001") part of an inch is forty-six thousand (46,000) times finer than the thickness of a new dime.

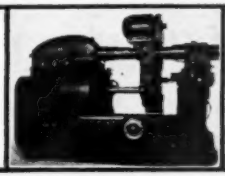
Reprinted by permission of the Ford Motor Company, Dearborn, Mich., from whom printed copies lithographed in colors may be obtained on request. Also, copies of another interesting booklet entitled—"He Measures In Millionths."

Giving Production a TAIL WIND,,

BY GRINDING AIRPLANE ENGINE PARTS ON BRYANT GRINDERS



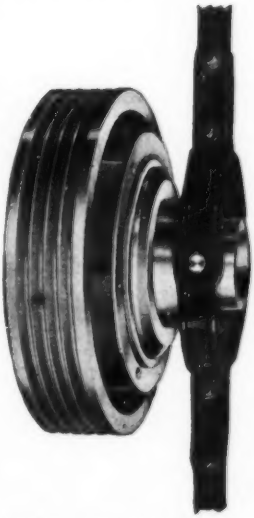
BRYANT Internal Grinders are like a "Tail Wind" to production schedules in the plants of aircraft engine manufacturers throughout the world. We illustrate the Bryant No. 24-36 with the exclusive Bryant feature of single slide control, and single lever operating control. This means faster handling, easier operation, and greater accuracy than any other machine offered for this class of work. This machine is shown grinding the inside bores in a three-blade propeller hub. The holding fixture is designed so that all three bores may be ground in one setting, merely by taking out the locating plug, revolving the fixture one-third of a revolution, and inserting the locating plug again. . . . Bryant experience in designing fixtures and machines to handle a wide range of jobs is a real asset — why not let us show you how to make profits on the tough jobs?



BRYANT CHUCKING GRINDER COMPANY
Springfield, Vermont

RIGHT IN THE GROOVE

The Conway Clutch Sheave is just another able bodied application of the versatile and splendid Conway Disc Clutch.



Conway Clutches are kept abreast of the improvements in industrial drives, and are always in step with the trend of modern machinery design towards higher speeds and lighter weight per horsepower capacity.

Conway meets the new stress factors with sturdy steel plates that withstand sudden torque—husky actuating levers—rugged carriers—Oh, there's so much to say about

The last word in friction clutches.

Have you Conway Bulletins P-24, L-28 and XYZ-L on Disc Clutches, S-10—Overload Release and Slip Clutches, —No. 36-A Compression Clutches—K-32—One Revolution Clutches, E-8—Expansion Clutches?

THE CONWAY CLUTCH CO.

1541 Queen City Ave. Cincinnati, Ohio

Clamp Shoes and Plugs

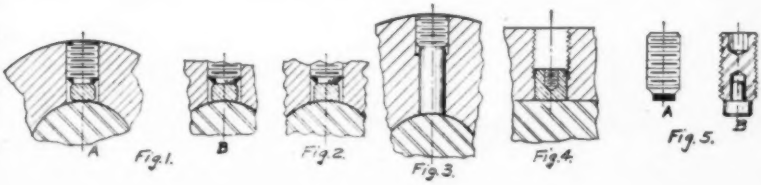
An Informal Review of the Methods and Means of Clamping Loose Members on Shafts or Spindles.

By H. F. WILLIAMS

PROBABLY the most common method used to clamp a collar, bushing, sleeve or any other loose member on a plain or threaded machine shaft or spindle is to use a flat ended or cup pointed steel set screw. In most cases, such an arrangement is objectionable because the shaft is marred or scored making it difficult to disassemble the part without serious damage. After prolonged clamping and unclamping, the flat pointed screw mushrooms to such an extent that the screw cannot be withdrawn without injuring the threaded hole. When the cup pointed screw is used, because the screw is usually heat treated, the bite or displaced ring of metal in the shaft makes it impossible either to rotate the collar or slide it axially along the shaft. Much the same action takes place when a cone pointed screw is used on a threaded member. Unless the screw point lines up exactly with the center of the thread groove, the clamping effect distorts the thread permanently, thereby making it hard to turn the threaded collar on the shaft. In the case of the first two screws mentioned, a flat is milled on the shaft, or a square groove is turned completely around the shaft to accommodate the set screw. This eliminates danger to the bearing surface and facilitates disassembly, but it still produces an unsightly appearance especially after numerous clamping positions have been utilized.

To overcome these objections, the simplest method is to use a soft round brass plug of such a diameter that it clears the root diameter of the threaded hole by 0.010" or 0.015". The smaller sized plugs can be sheared from brass rods while the larger sizes are sawed or cut off. The rough edges are broken, or better still, chamfered approximately 45 degrees on both ends. The latter method prevents "bashing" down or expanding of the soft metal to such an extent that easy disassembly becomes impossible. The length of the plug can be made to suit the conditions, but in most instances 2/3 of the diameter is sufficient. Sometimes hard or semi-hard flat brass stock is punched for such plugs.

In Fig. 1 at A, a chamfered plug is shown with flat end contacting the shaft. If the brass is soft and the screw pressure sufficiently great, the



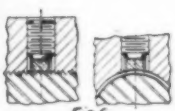


Fig. 6.

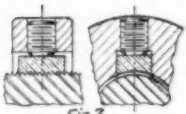


Fig. 7

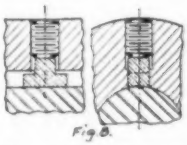


Fig. 8.

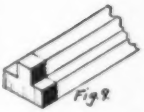


Fig. 9

plug will compress to fit the shaft as shown at B. If the material used is harder, the end can be milled concave. Another method is to insert the plug into the threaded hole backed up by the screw and turn a reamer in the collar hole, gradually feeding the plug into greater engagement with the reamer by the set screw. Such a plug need only be chamfered at the one end as in shown in Fig. 2.

When the clamped member is some distance from the outer surface of the piece, the plug is made longer than contemplated by the previous illustrations. This is shown in Fig. 3. A short set screw is used, thereby eliminating the necessity of tapping a deep hole its entire length. The engaging end receives the same treatment as recommended in Fig. 2.

For Frequent Removal

If it becomes necessary to remove the plug from a deep hole at frequent intervals, when the diameter of the plug permits, it can be tapped as shown in Fig. 4. Upon removal of the clamping screw, a small threaded rod can be screwed into the tapped hole at the upper end of the plug so it can be withdrawn from the hole. In this instance, the screw hole is threaded only partially, the clamp plug receiving its bearing in the tap-size drilled hole.

At times it is advisable to have the screw and plug integral, for removal purposes. At A in Fig. 5, a thin brass wafer is brazed to the end of a flat pointed set screw. The diameter of the wafer should be of such size as to permit flattening or expanding. It is best to make it of a harder brass. Another method is shown at B in Fig. 5, in which the set screw is drilled and reamed, before it is heat treated, to receive a shouldered brass plug. In both cases, the plug turns with the screw and can therefore be used only when clamping on smooth round or flat surfaces.

Thread Engagement

Although screws or other threaded members can be held by plugs with flat ends, it is obvious that only the tops of the threads are in contact with the clamping member. A better method is shown in Fig. 6. Here the end of the plug has a series of serrations to engage the thread completely. The plug is first cut off to its required length, and as in Fig. 2. The plug is fed into engagement with the tap gradually by the clamp screw until a full depth thread has been cut. This plug is, of course, cylindrically shaped, slightly smaller than the root diameter of the threaded hole.

Because of the limited length of the thread engagement in a round plug, controlled by the size of set screw used, it is often desirable or necessary to have both greater width and length of clamp plug or either. This is accom-

Fig 10

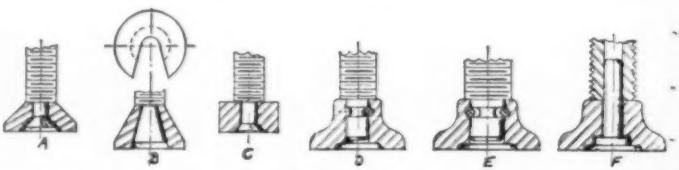
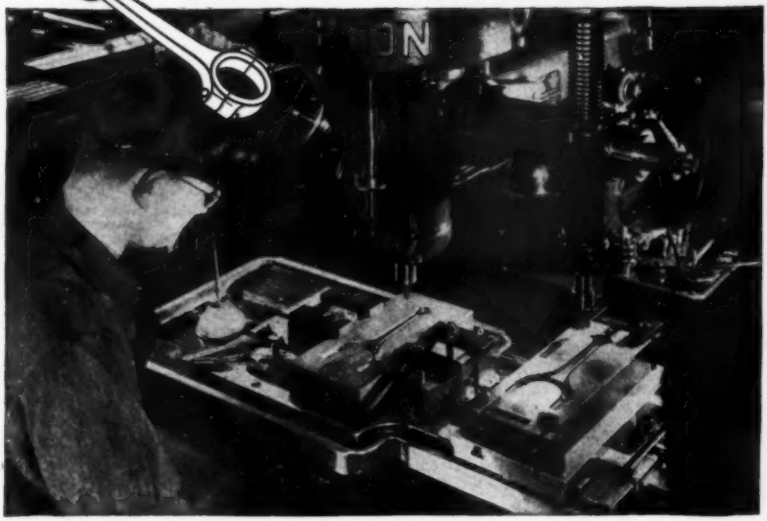


Fig 11.

BETTER FORGING DIES



With GORTON DUPLICATORS

The illustration shows a Gorton Duplicator working on a connecting rod coin forging die. The producers of this die had tried several methods of quantity reproduction to close limits and found that the required speed, accuracy, and economy were possible only with Gorton equipment. Send for bulletin No. 1319-B.

Mail Coupon Today ➡

George Gorton Machine Co.
Engineering Research Dept.
1115 13th St., Racine, Wis.

Please send me bulletin No. 1319-B with complete information on Gorton Duplicators.

Name.....

Position.....

Firm Name.....

Street.....

City.....

State.....

GEORGE GORTON MACHINE CO.
1115 13TH STREET, RACINE, WISCONSIN, U. S. A.

plished by shaping a key slot into the bore of the collar and tapping the screw hole into the slot as shown in Fig. 7. Into this slot, with free sliding fit, is inserted a square or rectangular piece of soft brass which is serrated as suggested in Fig. 6.

The plug illustrated in Fig. 8 at A has a square portion on top to engage the tapped hole, this feature being intended to locate the plug laterally, especially when it contacts a flat surface. Such a plug can be used when there is axial adjustment to maintain. An inexpensive way to make this clamp is shown in Fig. 9. A flat piece of brass is straddle milled to a Tee-shape, the width of the protruding part being made slightly less than the tap-size drill. After milling, the pieces are cut off, also slightly narrower than the drill diameter so as to give a square projection, the corners of which, at times, come in contact with the threaded hole. This same design can, of course, be applied to a threaded shaft, but the projection is not wholly necessary for such shafts.

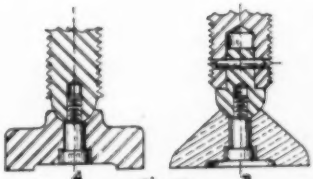


Fig. 12

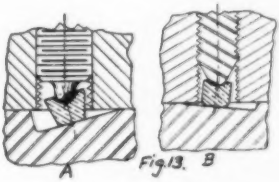


Fig. 13.

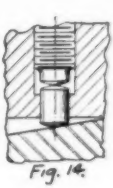


Fig. 14.

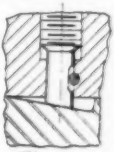


Fig. 15.

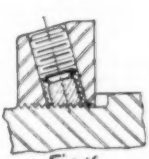


Fig. 16.

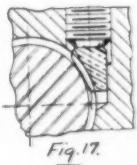


Fig. 17.

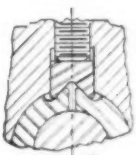


Fig. 18.

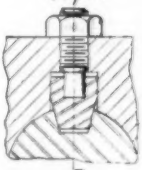


Fig. 19.

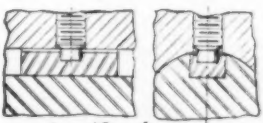


Fig. 19. A

Screw Within a Screw

In many mechanisms, it is required that the clamp plug and screw be integral, yet free and self-aligning. In the method shown in Fig. 10, the heat treated hollow head cap screw is annealed, drilled and counterbored to receive a smaller fillister head cap screw. Both drill and counterbore sizes are somewhat larger than the screw, for a loose fit. The length of the small screw is also such as to be free in the hole, as shown. Although the shoe can be used with flat end, the one shown will find its proper contact readily when assembled.

In the six methods illustrated in Fig. 11, it is necessary first to assemble the screw in the threaded hole and then attach the clamping shoe. At A, the end of the screw is turned down to form a shoulder for a solid conical washer. The end of the screw is peened over, after the shoe is in place, but

Sundstrand Bench Centers

Ideal for Rapid, Precise Checking Between Centers

Sundstrand Bench Centers are ideal for checking work rapidly and accurately between centers in tool-rooms, production departments, repair shops, garages. They are accurate, rigid, compact, durable, economical. Heads are adjustable. Centers are hardened and ground, an accurate taper fit in spindles. Right-hand head has spring-pressed spindle and lever for rapid work-handling. Made in 7 handy sizes.

DEALERS — Sundstrand Open Line includes Balancing Tools, Bench Centers, Index Bases. Big value. Excellent sales prospects. Investigate.

● **Write, today, for illustrated Bulletin SBT-436 fully describing Sundstrand Bench Centers, Balancing Tools and Airport Service Equipment.**

Sundstrand Machine Tool Co., 2535 Eleventh St., Rockford, Illinois, U. S. A.

RIGIDMILS - STUB LATHES
Tool Grinders - Drilling and Centering Machines
Hydraulic Operating Equipment - Special Machinery

plished by shaping a key slot into the bore of the collar and tapping the screw hole into the slot as shown in Fig. 7. Into this slot, with free sliding fit, is inserted a square or rectangular piece of soft brass which is serrated as suggested in Fig. 6.

The plug illustrated in Fig. 8 at A has a square portion on top to engage the tapped hole, this feature being intended to locate the plug laterally, especially when it contacts a flat surface. Such a plug can be used when there is axial adjustment to maintain. An inexpensive way to make this clamp is shown in Fig. 9. A flat piece of brass is straddle milled to a Tee-shape, the width of the protruding part being made slightly less than the tap-size drill. After milling, the pieces are cut off, also slightly narrower than the drill diameter so as to give a square projection, the corners of which, at times, come in contact with the threaded hole. This same design can, of course, be applied to a threaded shaft, but the projection is not wholly necessary for such shafts.

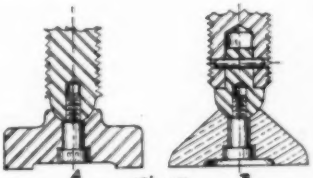


Fig. 12

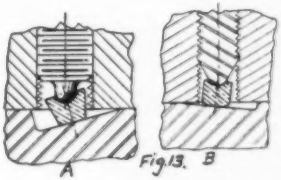


Fig. 13.

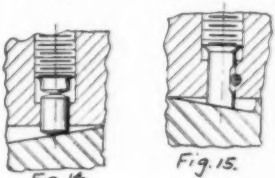


Fig. 14.

Fig. 15.

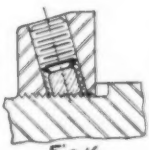


Fig. 16.

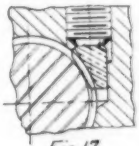


Fig. 17.

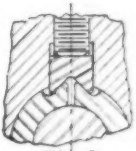


Fig. 18.

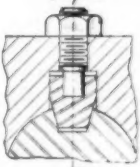


Fig. 19.

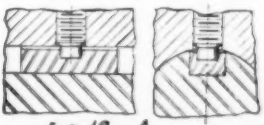


Fig. 19. A

Screw Within a Screw

In many mechanisms, it is required that the clamp plug and screw be integral, yet free and self-aligning. In the method shown in Fig. 10, the heat treated hollow head cap screw is annealed, drilled and counterbored to receive a smaller fillister head cap screw. Both drill and counterbore sizes are somewhat larger than the screw, for a loose fit. The length of the small screw is also such as to be free in the hole, as shown. Although the shoe can be used with flat end, the one shown will find its proper contact readily when assembled.

In the six methods illustrated in Fig. 11, it is necessary first to assemble the screw in the threaded hole and then attach the clamping shoe. At A, the end of the screw is turned down to form a shoulder for a solid conical washer. The end of the screw is peened over, after the shoe is in place, but

Sundstrand Bench Centers

Ideal for Rapid, Precise Checking Between Centers

Sundstrand Bench Centers are ideal for checking work rapidly and accurately between centers in tool-rooms, production departments, repair shops, garages. They are accurate, rigid, compact, durable, economical. Heads are adjustable. Centers are hardened and ground, an accurate taper fit in spindles. Right-hand head has spring-pressed spindle and lever for rapid work-handling. Made in 7 handy sizes.

DEALERS — Sundstrand Open Line includes Balancing Tools, Bench Centers, Index Bases. Big value. Excellent sales prospects. Investigate.

● **Write, today, for illustrated Bulletin SBT-436 fully describing Sundstrand Bench Centers, Balancing Tools and Airport Service Equipment.**

Sundstrand Machine Tool Co., 2535 Eleventh St., Rockford, Illinois, U. S. A.

RIGIDMILS - STUB LATHES
Tool Grinders - Drilling and Centering Machines
Hydraulic Operating Equipment - Special Machinery

only sufficiently to retain it and still allow the screw to turn independently of the shoe. At B, the washer is of the same general shape except that it is open at the side, horse shoe fashion. The end of the screw is turned with a reverse taper for washer retention and all that is necessary is to slide the shoe on, without additional peening or riveting. The method at A can also be applied to a square, round or rectangular block and loosely riveted as at C. Here it is necessary that the peened end of the screw does not protrude beyond the surface of the shoe. At D, a circular groove is turned in the screw end. A hole is drilled in the hub of the shoe, for a pin which engages the screw groove. This allows the shoe to be rotated on the screw. There is freedom enough also, to allow contact during clamping with the screw shoulder rather than with the pin and groove. The method shown at E is similar, but a small snap ring, made from one partial coil of a helical spring, engages the slot to retain the shoe. When assembling or disassembling, the spring is compressed into the slot of screw, and when both slots in the screw and shoe line up, the spring snaps outwards for shoe retention. At F, the screw end is reamed a press fit for a shouldered pin. The shoe is drilled and counterbored a loose fit for the pin. In this case, the pin hole should be drilled the entire length of the screw, so it can be pressed out if necessity arises, to replace the shoe. Another method is to have the pin a loose fit in the reamed hole of the screw end, retaining the shoe pin with a smaller cross pin which can be pressed out readily for replacement.

Swiveling Action

If a greater swiveling action for the shoe is required, the methods as shown in Fig. 12 can be used. At A, the end of the screw is turned hemispherically and tapped for a short distance for a small diameter screw. The screw is shouldered at the pivot end of the clamping screw. The hole and counterbore in the shoe are large enough to provide plenty of freedom for the retaining screw. The upper end of the shoe is milled out with a hemispherical depression for proper contact with the end of the adjusting screw. In another method shown at B, the clamping screw is turned flat on the end, and a pin having a hemispherical head is inserted into a hole in the end of the screw and pinned as shown. The shoe is then attached as already explained.

Sometimes is is necessary to clamp an inclined surface as illustrated in Fig. 13 at A. The brass plug is tapered to the same angle as that of the incline and has a flat lower contacting end. The other end has a spherically shaped depression to accommodate the ball pointed screw. If the angle of the inclined surface is not too great as at B, the point of the clamping screw need only be turned conically and have the end rounded to engage the shoe.

Inclined Surface

Another way of clamping on an inclined surface is to use an oval headed pin as shown in Fig. 14. The pin has a bearing in the drilled hole. By rounding both the ends of the pin and screw, mushrooming is prevented.

In Fig. 15, the shoe is made of hardened drill rod and the end ground off to the clamping angle. To keep the shoe angle in correct relation with the angular clamped surface, and also to keep the shoe from falling out, a flat is milled in the clamp shoe to engage a pin driven into the body of the mechanism.

To eliminate the necessity of drilling

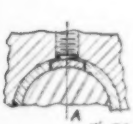


Fig 20

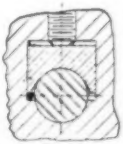


Fig 21

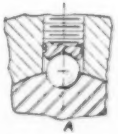


Fig 22

The Utility Sleeve

SAVE MONEY WITH THESE

UTILITY Tools

You can cut small tool costs with a UTILITY SLEEVE—a removable taper shank tool driver that saves at least 40% (some customers report 75% savings). It is used with taps, drills, countersinks, reamers, end mills, center drills, counterbores, woodruff cutters, taper pin reamers, etc. The sleeve is a two jaw collet in action, fitting over the diameter of the shank of tool, which is positively driven by flats or the tang on shank end.

A test in your own plant will quickly prove the superiority of the UTILITY Friction-less LIVE CENTERS. They are made for the smallest tool room lathes, as well as the largest railroad shop equipment. Large taper thrust and annular roller bearings, precision mounted, assure accuracy and long life under severe conditions. Front bearing cone seats on resilient pad —a shock absorber that protects against tool breakage or spoilage of work. Available in Taper Shank, Slip-in, Slip-over & Spindle Types.

The PRECISION "Center of Centers"

Utility Tools

Special bulletins give full information on Utility Tools. Check the ones in which you are interested, pin to letterhead and mail.

Floating Holders
Countersinks
Spot Facers
Sleeves
Live Centers
Counterbores
Core Drills
Reamers

Pin to letterhead and mail Now!

Send for bulletins giving full information—also details of our 30-day Free Trial Offer.

The J. C. GLENZER CO., Inc.
6465 Epworth Blvd.
DETROIT. MICH.

through the rim of a pulley or other flanged member, the plug and screw in Fig. 16 are placed at an angle to the shaft axis. The end of the pin is milled to this angle and serrated as revealed in Fig. 6.

To take advantage of greater clamping action, as afforded by angular binding, the method in Fig. 17 is sometimes used. Lengthwise, the pin is slabbed off at the required angle. It is used on both smooth and threaded shafts, the illustration showing the latter. The thread serrations are milled.

In Fig. 18 the plug is milled at the lower side to 90 degrees included angle for its entire length. It fits into a key slot in the outer member. The split ring has a milled groove either side of the space for engagement of the shoe. When screwing in the clamp screw, the shoe pulls the split ring together thereby clamping the shaft in place.

Shoes and Keys

Combination clamp shoes and keys are shown in the next two sketches. In Fig. 19 at A, the end of the dog pointed set screw engages the hole in the shoe. When the outer member is moved axially after the screw is loosened, the shoe is retained in place by the screw. At B, a special screw with long turned down end is used and fits into the taper sided shoe-key. At times it is used in a clamped position when it is only necessary to turn up the clamping screw. At other times the inner member must slide when the screw is loosened sufficiently and locked in such a position by hexagon nut. The shoe-key is made of hardened steel.

In Fig. 20 at A, the bushing is milled out as shown, with an end mill, the shoe being slightly less in thickness than that of the bushing wall. A flat pointed set screw does the clamping. At B is a plan view of the shoe, showing the screw in section and the clearance around the shoe in the bushing.

In Fig. 21, the shoe is somewhat larger than the clamped member. A half round groove is milled in the shoe and the sides of this groove relieved approximately 15 degrees per side to avoid binding. The shoe is sometimes

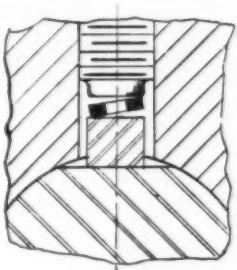


Fig. 23

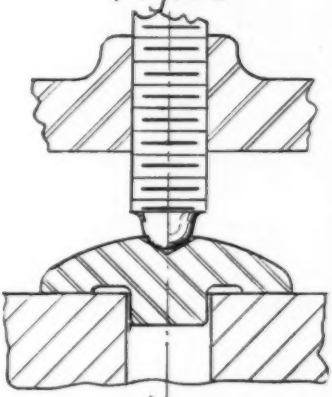


Fig. 24.

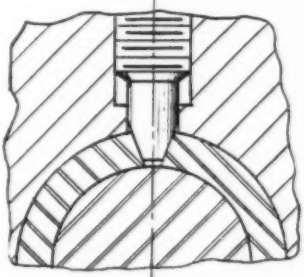
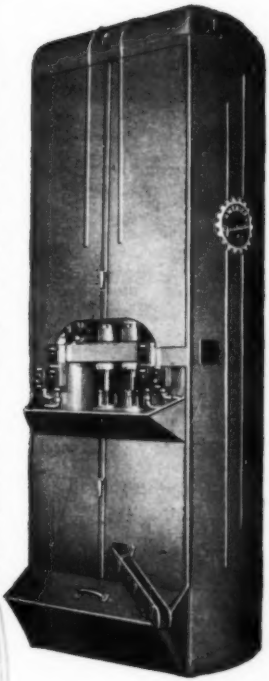


Fig. 25

We broach gears!

400 PER HOUR



YES, WE BROACH GEARS!

AMERICAN has perfected a method of broaching commercial gears COMPLETE with ONE PASS OF THE BROACHES in only a FEW SECONDS! CONSIDER THIS STATEMENT!

On the starter pinion shown to right nine external gear teeth are broached simultaneously at the rate of 400 PER HOUR. Commercial concentricity, limits and finish are maintained. By previous methods only 50 gears were finished per hour. Our method represents a production increase on this job of 700%.

Machine shown to the left is AMERICAN GEAR-BROACHER No. 2 and is NOT an ordinary broaching machine, as it is specifically designed and built for GEAR-BROACHING.

If you use or manufacture gears, it will pay you to investigate this NEW and FASTER METHOD OF GEAR PRODUCTION!

Patents Pending

AMERICAN BROACH & MACHINE COMPANY

ANN ARBOR, MICHIGAN, U. S. A.

BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY

MICROMETER OFFSET
BORING HEADS

No. 35
$60.00

A New Flynn Micrometer Offset Boring Head
Write for catalogue.

Boring Bars

The new small bars 3/16, 1/4, 5/16 and 3/8 in. dia. Set of 4—$5. Larger bars up to 1½ in. diameter.

Flynn Manufacturing Company
435 Bates Street Detroit, Michigan

BAUMBACH

STANDARDIZED
Machined Steel DIE SETS Semi-Steel
Drop Forged Steel

Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

Send for our new 336 Page Catalog.

E. A. BAUMBACH MFG. CO.
1810 So. Kilbourne Ave., CHICAGO, ILL.

made double, i.e., by reaming a hole in a block and cutting in half at the centerline, thereby making two blocks.

In Fig. 22, the shaft has milled in it, a half round groove for a considerable length. The screw-holding member has a hole tapped in it to the large hole as shown. Instead of using a plug or shoe, a brass ball is used, one side fitting into the groove, the upper surface nesting into the hollow cup point of a set screw, shown at A. A steel ball can also be used. If the unit pressure is too great, as the ball has but a line contact in the groove, a round rod can be sawed in half to the required length backed up by a flat pointed set screw, as at B. Another method is to use a round rod or pin at C, as long as necessary, this pin engaging the half round slot in the shaft and one in the collar, the pin being placed parallel with the shaft axis and held with a flat pointed set screw.

In Fig. 23, the shaft is milled flat, against which a steel shoe contacts. Between the clamping screw and the shoe is placed a lock washer with serrated or pronged faces. The illustration shows the assembly before clamping. The washer prongs bite into the shoe and screw, thereby preventing loosening.

The screw carrying member in Fig. 24 swings out of the way when the screw is backed out. The screw end is ball pointed and engages a depression at the upper end of the shoe. While the clamping shoe is a loose member, it is kept in place by the pilot at the axis of the shoe, after the screw is loosened.

The steel ring in Fig. 25 is split with an angular cutter. In this slot fits a hardened drill rod pin, slabbed off either side to engage the angular slot in the ring. As the screw is turned in, the ring is wedged apart to clamp the ring at its outer periphery.

The second and concluding part of this article will appear in a subsequent issue. This will deal with other types of plug clamps made both of brass and steel. Various other types of shoes for permanent clamping and temporary binding will also be included.

The AUTOMATIC TAPPER

with the ADJUSTABLE CLUTCH

Automatic in action, with an adjustable clutch—an exclusive feature — CP Universal Tappers cut costs on production lines:

— A slight pressure gives right-hand rotation; backing the tool away from the work reverses the rotation.

— The adjustable clutch — regulated through a thumbscrew on the gear case — operates only when tap encounters blind hole or other obstruction, up to predetermined overload adjustment.

For complete data on CP Universal Tappers write for Catalog 899.

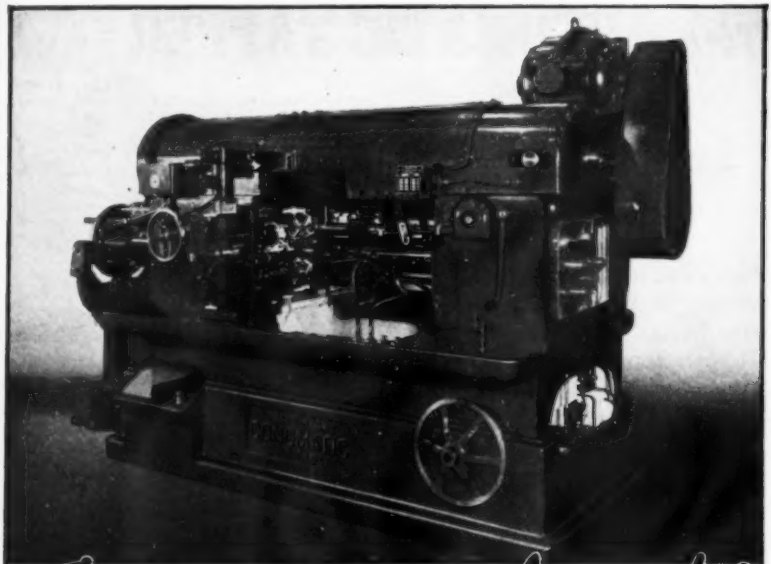
CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 6 EAST 44th STREET, NEW YORK, N. Y.

SALES OFFICES AND SERVICE STATIONS THROUGHOUT THE WORLD

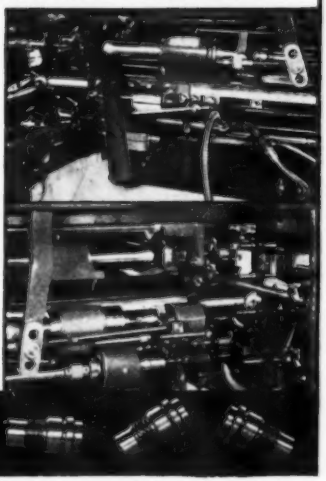
CP UNIVERSAL ELECTRIC TOOLS

DRILLS • SCREW DRIVERS • NUT RUNNERS • TAPPERS • GRINDERS • SANDERS



Time—10 seconds each!

IF it's performance you're after—if you're looking for *accuracy at top speed*—then look to the Conomatic. Here is a machine that is giving progressive manufacturers a full measure of satisfaction and profits. For example, take the parts produced on the 6-spindle Conomatic shown here. This part must be extremely accurate, yet requires wide forming cuts on a variety of diameters. In the fourth position a tapping attachment is used for threading an inside diameter 5/16 x 18" at the *same time* as a die is threading an outside diameter 5/8 x 27". Production—one part every 12.5 seconds at 80% production. If you want to increase your production and profits on complicated parts write to Cone—there is a Conomatic for every screw machine job.



CONE AUTOMATIC MACHINE CO.
WINDSOR, VERMONT, U. S. A.

Building Your Own Comparator

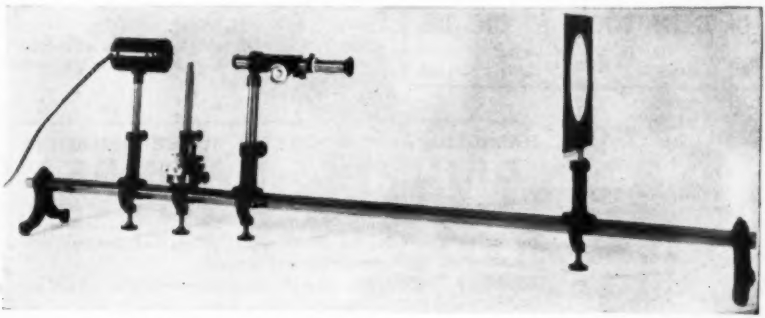
A Simple and Easily Assembled Projection Instrument That Facilitates the Examination and Gaging of Small Parts

By JOSEPH DAUBER

USING standard optical bench parts, such as are frequently employed in research laboratories. The Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago, point out that it is a simple matter to build a projection comparator for the examination of small parts. A projector assembled in this manner has three major advantages:—(1) The cost is comparatively low. (2) Parts are interchangeable so that other equipment may be added as desired (usually no machining operations are necessary). (3) The individual parts, such as the microscope, the high power lamp and the swiveling clamp can be put to many other important uses in the shop.

As shown, the projector comprises a high powered lamp, operating on a 6 volt transformer, which illuminates the horizontally-mounted microscope. At the extreme right is the ground glass screen on which the image appears. Each of these parts is mounted on a detachable rod of standard diameter, which is a good sliding fit in a right angle clamp. The clamps, in turn, are mounted on a long rod of square section, along which they can be moved for adjustment. The square horizontal rod is provided with detachable end supports.

Between light source and microscope is mounted a standard swivel clamp in which is detachably inserted a rod having its upper end threaded. To this can be attached a small platform with centers, V-block or other method of holding the object to be examined. The swivel clamp is so constructed that the upper portion rotates accurately on the lower portion, a scale on the clamp reading the rotation directly to 5°; 1° can be estimated readily. The upper portion of the swivel clamp has a cross-slide operated by a screw, having a range of motion of 1".



Here's the layout of the improvised Projection Comparator, comprising the high powered lamp, support for object, microscope and the ground glass screen, respectively, left to right.

In operation, the part to be examined is placed in an object holder improvised by the user on top of the vertical rod in the swivel clamp, and the swivel clamp moved back and forth in front of the microscope until a clear image of the object is focused on the ground glass screen. Final focusing can be accomplished by the rack and pinion on the microscope. The actual enlargement can be determined readily by measuring on the screen the distance between two points on the object, the actual distance between which is known. For measurement on screw threads, the swivel clamp should be rotated to correspond with the helix angle of the thread.

The image is clearly visible in a well-lighted room, but for best results, direct light should be shielded from the screen. An additional improvement will be effected if a small disc, about 4" in diameter of cardboard or metal, is attached to the microscope to shield the screen from stray light from the projection lamp.

In place of the ground glass screen, the user can substitute drawings on translucent paper with which the object can be compared. No re-focusing is necessary when it has once been adjusted to a given object. A standard microscope will give magnifications up to about 50 times. It is possible to obtain magnifications of 100 times and more by interchanging microscope objectives, which are low in price.

LET US QUOTE . . .

Our new modern plant is fully equipped with special machinery for

COMMERCIAL JIG BORING, DESIGNING AND BUILDING

of

DIES, JIGS AND FIXTURES LARGE OR SMALL

We can handle your Jig Boring jobs at reasonable prices on our new 18"x36" Pratt & Whitney Jig Borer. Quick service.

Have been delivering satisfaction since 1929—let us serve you.

QUALITY TOOL & DIE CO.

Ray W. Rice, Manager,

401 N. Noble St., Indianapolis, Ind.

Welding Electrode Chart

From a chart just issued by The Lincoln Electric Co., Cleveland, Ohio. it would appear that there is now available an arc welding electrode for welding practically every conceivable job.

The chart, in attractive design and color, gives uses, physical characteristics, etc., as well as currents and procedures for some 36 different electrodes.

The chart will be of value to shop superintendents using welding. It will also be of value to designing engineers since physical characteristics of weld metals are given.

HAMILTON — MUEHLMATT SUPER SENSITIVE

DRILLING MACHINES

Drilling small holes in the smallest wire gage sizes is no problem with Muehlmatt Drilling Machines. They are used extensively for drilling Diesel Injector Nozzles, Instrument and Jewelry work. Users report 100% savings on drill breakage.

Muehlmatt Drilling Machines are the answer to your small drilling problems. Let us tell you more about them. ***Write for information.***

A. MUEHLMATT DIVISION OF THE HAMILTON TOOL CO. B and Wayne Sts., Hamilton, Ohio

DoALL BAND SAWS

MEET AMERICA'S ORDER FOR SPEED

Not only the speediest saws ever designed, but the cleanest cutting. CHIPS TELL THE STORY

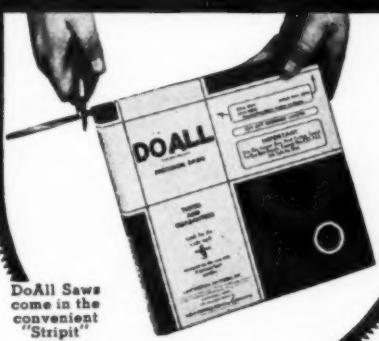
DEVELOPED FOR USE ON THE DOALL CONTOUR MACHINE, THE WORLD'S FASTEST PRECISION SHAPE CUTTING MACHINE TOOL

There's a DoAll Band Saw for every kind of metal regardless of toughness, ductility and hardness. Send for interesting research booklet on such metals as:

S.A.E. 3150 heat treated to 33—39 C Rockwell
Laminated Low Carbon Steel Sheets
Cold Rolled Nickel
Very Ductile Aluminum Alloy
Roller Bearings
4" thick Cast Brass
3/16" Neoprene Sheets
3" Cast Iron
Laminated Bakelite Strips.
Semi-steel Castings
Grade "C" Piping

Poor Chips from other saws.

Curled, Clean DoAll Cuttings



DoAll Saws come in the convenient "Stripit" cartons, originated by DoAll

DO ALL SAWS

Take advantage of our Free Offer to make tests on any tough sawing job.

Stocks and Service everywhere. Consult your phone book or write us.

DoALL SAWS
(Division Continental Machines, Inc.)
DES PLAINES, ILL.

H-8

☐ Send booklet "Actual Performance Records of DoAll Saws"

☐ Send details of Free Saw Test offer

Name.....

Address.....

BROACHING PAYS in Aircraft Quantities

ARTICULATED RODS CONTOUR-BROACHED IN 5 OPERATIONS ON ONE MACHINE

SEQUENCE OF OPERATIONS

1. Broach face, channel side, and face on bosses.
2. Reverse rod and broach opposite side and faces with same tooling.

Change fixtures and tooling, and

3. Broach one flat arm face.
4. Reverse rod and broach opposite side with same tooling.
5. Simultaneously with (3) and (4) contour broach large and small ends of rods.

Capacity 100-120/hour per operation per ram.

Machine used: Colonial Dual Ram with interchangeable fixtures and tooling by Colonial.

Machining all sides of the entire outer surface of aircraft connecting rods (except the channel recess) is today being accomplished on a single broaching machine, eliminating costly and slow contour milling.

Indicative of the flexibility of modern broaching equipment, the Colonial Dual Ram used at Wright Aeronautical Corporation for this purpose performs five operations with but a single change in tools and fixtures.

In process, a quantity of rods go through the first two operations. When a stock has been built up, tools and fixtures are changed, and the remaining three operations are performed simultaneously—and the rod which started as a rough forging, is ready for "touch-up" finish grinding.

If you have a form-machining problem it will pay you to have Colonial's Engineering Department study it. There is no charge for this service—and the cost per piece may surprise you.

Are you receiving 'Broaching News'? If not, a note on your company letterhead will place you on the mailing list.

COLONIAL BROACH COMPANY • 147 Jos. Campau, DETROIT, MICH.

Testing Machinability

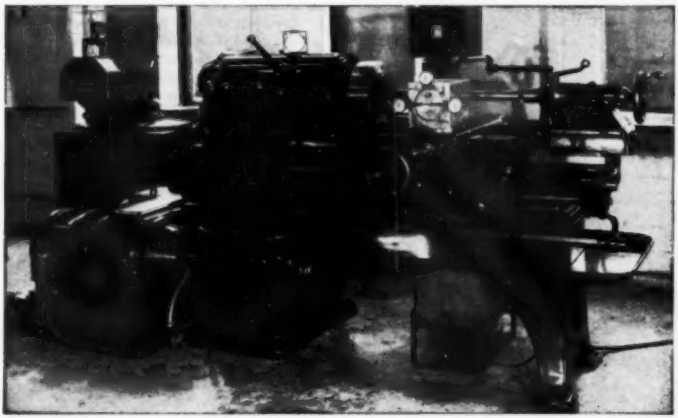
By FRANCIS A. WESTBROOK

THE University of Michigan College of Engineering has installed, in its metal processing laboratory, an engine lathe for the purpose of testing the cutting and machinability of metals, cutting fluids and tools. An interesting feature of the set-up is the drive which includes a motorized mechanical variable speed control unit. This provides minute speed variations between the 16 speeds of the geared-head type of lathe, necessary for the careful tests carried on.

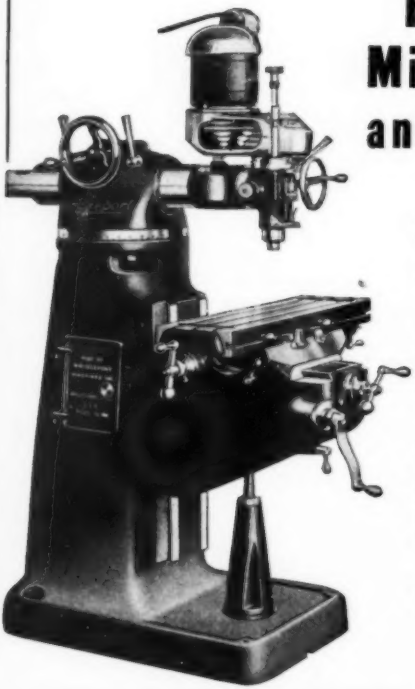
Need of the wide range of speed adjustments is emphasized by the conditions accompanying the making of a cutting-speed tool-life test on a piece of given diameter. The work runs at this diameter for a particular cut until it reaches the end. It is then of course reversed back to the tailstock and a new cut started to the proper depth. As the diameter is smaller this time it is necessary to increase the r.p.m. so that the peripheral speed of the work remains the same as on the former cut. Such adjustments are too fine for the gears, as a rule, and the infinitely variable mechanical speed control becomes necessary.

This method of speed control has advantages over rheostatic d.c. control in that all speed changes are gradual and uniform, whereas the rheostat has definite steps, representing corresponding changes in speed between which there is no integration. With the method described, the reduction in speed due to making the cut is uniform, and amounts to about half of one percent. With a d.c. motor this reduction is about 2 per cent for the heavier cuts, which is not so good for this kind of work.

The fact that the speed reduction, due to cutting is uniform, permits proper allowance when determining the peripheral speed of the work. That is, when the machine is running idle, the number of r.p.m., to give the desired peripheral speed is determined by means of the cutmeter. The speed is then set about one half of one per cent higher which will give the desired peripheral speed while the cut is being made.



WHERE ACCURACY MUST BE CONSIDERED — USE THE BRIDGEPORT TURRET MILLING MACHINE



For Difficult Milling-Drilling and Boring Jobs

A few of the advanced modern features that assure this needed accuracy are: Flexibility, Rigidity, Unparalleled Range and Versatility.

Angular settings in one plane are achieved by turning the hand wheel which controls the keyed overarm. Turret diameter is 15" with 5" overarm.

Column, knee and table construction are rugged, with wide ways and taper gibs for accurate and vibrationless operation. Table, knee and saddle locks are located in front for easy accessibility.

Graduated dials are 3¼" in diameter. Anti-friction bearings are used throughout.

Write for full details.

BRIDGEPORT MACHINES, INC.

52 REMER STREET • • BRIDGEPORT, CONN.

Unshackle Arc Welding

By C. M. TAYLOR, Vice President,
The Lincoln Electric Co.,
Cleveland, Ohio.

IT IS altogether absurd that a valuable and straight-forward industrial process such as arc welding, which has already created tremendous industrial and social benefits, and which will create still greater advances in the future, should be held back by restrictions and regulations which contribute nothing constructive but only serve to impede progress.

The worst feature of all restrictions is that the public many times questions the reliability of welding. As Mr. J. F. Lincoln, President of our Company, pointed out in a recent article that was widely quoted, there is no mystery in welding. The properly trained and capable welder will consistently make welds stronger than the steel, just as properly trained and able machinists will consistently turn out work machined to the closest tolerances.

Does someone stand over the trained mechanic checking every nut he turns down to make a bolted connection?

Is the trained riveter beset by checkers and inspectors on every rivet he drives?

Is the trained machinist harassed by supervisors on every operation of his lathe?

Are all these trained craftsmen required to pass a test at frequent intervals to qualify for work which they have been doing for years, for which their experience and ability make them fully capable?

Is every single riveted and bolted connection individually examined, inspected and tested?

Obviously, the answer to all of these questions is "No!"

Yet the present trend in regard to arc welding is in that direction. So many codes, tests, inspections, provisions, restrictions, regulations etc. are being imposed upon the process that the benefits it inherently creates are being seriously affected. Arc welders are severely handicapped not only by frequent interruptions to permit inspection of work in process, but also by having to be qualified over and over again for a type of work for which they have previously been fully accredited.

There is no more justification for this state of affairs in welding than in any other craft or trade. In fact, there is far less justification. Good welders will consistently make good welds, exceeding the physical properties of the metal welded, and they assure the quality of the weld by observing the inside of the joint as it is being made which is not possible with other less-supervised and less-controlled methods of construction.

All these restrictions are due simply to the misplacing of the emphasis and to misunderstanding of the basic principle of arc welding. The uninitiated automatically focus all their attention on the arc welded joint as the crux of the problem just as though the properly welded joint could acomplish any more than make a strong connection, fully as strong as the metal connected. As a matter of fact a good weld—and good welds are consistently made by good welders — develops the full strength of the steel welded. This be-

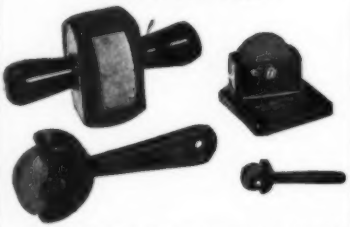
$25 BUYS A POSTEL DIE FILER
(f. o. b. Minneapolis)

A dependable, precision tool that will soon pay for itself.

Write for full information

The Postel Filing Mch. Co.
915 Washington Ave., So.
Minneapolis, Minn.

ABRASIVE WHEEL DRESSERS



KEEP GRINDING WHEELS SHARP AT LOW COST. SPECIAL DRESSER FOR SURFACE GRINDER GIVES HEAVIER CUT WITHOUT BURNING.

SEND FOR CIRCULAR

M & S DRESSER
377 CORNWALL ST.,
HARTFORD, CONN.

ing the case, why look to the weld for problems that never exist in reality? Why should every weld be individually inspected and tested when the welder who made it is fully as competent in his work as the riveter or bolter is in his? And why, above all, should an experienced welder be required to pass test after test to qualify for work he has been tested for previously?

All of these hindrances are poor practice and highly unfair to welders. Given proper electrodes and proper equipment, the experienced welder invariably will make good welds. He knows that his production of sound welds will enable his employer to advance through pronounced improvements and economies in operations. He knows, also, that the benefits which arc welding creates, stimulate expansion of his own industry, and by doing so broaden his opportunities for employment and assure his continued earnings. The good welder is a capable, conscientious worker upon whom all of the inspection and qualification tests serve only to work hardship. He wants these restrictions removed in order that he may be free to do his work properly and in order that the way may be cleared for further development and expansion of his industry.

As long as these pointless restrictions, regulations, etc., remain, progress with arc welding will be retarded and the immeasurable benefits that it can and will create for industry and society in general will remain unattained.

The "BABY GIANT" VANDERBEEK Universal Joints

are obtainable in two sizes—the "Baby Giant" for instrument and control work; and the "Giant", with hardened and ground working surfaces for heavy duty work.

Send us your requirements — We'll send you prices.

AMERICAN TOOL WORKS, INC.
26 FRANCIS AVE. -:- HARTFORD, CONN.

In Addition to the *WYCO* Line of FLEXIBLE SHAFTS and MACHINES

WYCO SPEED SAW

$15.00

This inexpensive speed saw when once used becomes a necessity in every electric, plumbing, carpenter, machine and automobile shop. Will cut accurately in any direction and at any angle. Uses 5" saber type saw blades.

Simply chuck the WYCO Speed Saw in any small electric drill. Hold drill in right hand and guide the saw with the left hand. Cuts through wood, metal, plastics, bakelite, beaver or plaster board. Will also do filing by inserting ¼" shank files.

Comes complete with six assorted saw blades for wood and metal, and one high speed machine file. *Send for yours today.*

WYCO MOTOR DISC

This 12" motor disc makes a powerful disc grinder out of that spare motor in your shop. Heavy type—cast iron disc—tilting table.

Supplied with 6 assorted sander discs and 1 can of WYCO disc cement. Price less motor—$12.00. Extra 12" cast iron discs—$5.00.

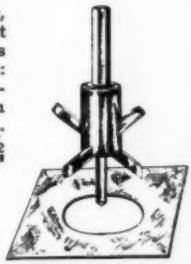
Please specify bore desired on motor disc. Write today.

WYCO HOLE CUTTER

Fits into electric drill, drill press or carpenters brace.

Cutter bits are standard high speed lathe bits and are easily sharpened. WYCO hole cutters furnished with hardened pilot pin, can be used with a pilot drill if desired.

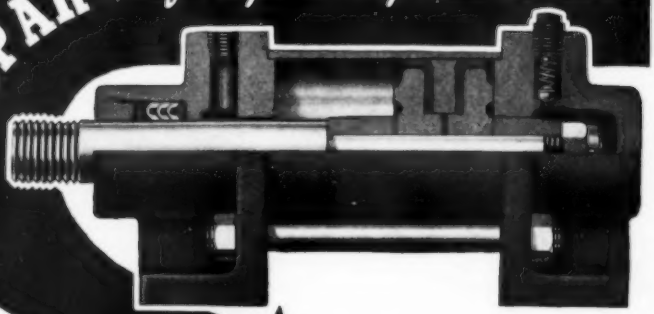
Has no clamps, wedges or set screws. Comes in two sizes: No. 2½ — adjustable from ⅞" to 2½" . . . $2.50. No. 4½ —1¾" to 4½" . . . $4.50.



WYZENBEEK & STAFF, Inc.

836-838 W. HUBBARD ST., CHICAGO, ILLINOIS

NOPAK *Self-Regulating* AIR CUSHION



Sectional View of NOPAK Air Cylinder with Self-Regulating Cushion.

What it IS . . . *What it* DOES

The NOPAK Self-Regulating *Cushioned* Air Cylinder is one cylinder which requires no adjustment. The *cushioning action* at the end of each piston stroke is controlled automatically. As the piston sleeve enters the bore in the cylinder head, the air trapped between piston and cylinder-head acts as an air-cushion over the entire piston surface.

"Cushion" Remains Constant

The smooth, gradual, *cushioning action* (predetermined by the taper, tolerances and length of cushion-sleeve, and by exhaust-bore diameter) *remains constant* at all times regardless of stroke length or cylinder bore. There is no needle-valve to be frequently re-adjusted, to clog up, get out of order.

Other Advantages of Built-In Air Cushion

- Eliminates Damaging Metal-to-Metal Impact, Noise, Shock and Vibration.
- Prolongs Cylinder Life —Reduces Wear on Piston and Cup Leathers.
- Cuts Maintenance Costs.
- Provides Cushioned Air Cylinders in Non-Cushioned Price Range.
- Assures Smooth, Quiet, Efficient Operation at Low Cost.

For Complete Data, ask for Bulletin 77

GALLAND-HENNING MFG. CO.
2754 South 31st Street • Milwaukee, Wis.
Representatives in Principal Cities

NOPAK VALVES and CYLINDERS
DESIGNED for AIR or HYDRAULIC SERVICE

A 3116-1P

What's New in the Industry

Red Ring Profiling Machine

A new profiling machine is announced by National Broach & Machine Co., Detroit, Mich. It is said to be rapid, entirely automatic and capable of holding finished work to a tolerance limit of .002". Stopping itself at the end of the cutting cycle, one operator can handle more than one machine. All he is required to do is load and unload the two work fixtures.

Machines of this type are said to have been in use for some time on rifle parts.

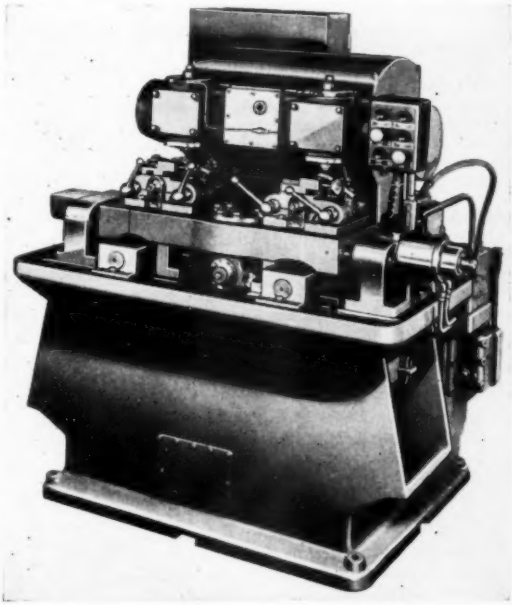
The Red Ring way is emphasized as strictly a profiling operation, not to be confused with three dimensional duplicating, as used to make automobile fender dies from a plaster or wooden pattern. The method is restricted to the milling of profiles, internal or external, flat or undercut, on parts having a profile pattern not larger than 6" x 8" x 2" thick where the cut is ⅛" deep or less on a face ¾" wide or less.

The principal field of application lies in the manufacture of parts for small arms and artillery breach mechanisms; the duplication of all kinds of flat cams; the profiling of airplane pistons and connecting rods to reduce weight; the production of instrument parts, accurate machine elements and electrical equipment parts.

The machine utilizes a closed differential hydraulic circuit to actuate its movement. This assures freedom from chatter, greater responsiveness to directional changes of guide pin and closer limits of accuracy in the finished parts.

The system includes a hydraulic pump which actuates the pistons by drawing a measured amount of fluid from one side and transferring it to the other. A second pump maintains and regulates the amount of pressure in the system.

The work table carries two work fixtures (to double the rate of production) and moves laterally. The spindle head carries two spindles (one for each work station) and moves at a right angle to the direction of table movement. These



two principal movements are both reversible, and each is actuated by its own hydraulic cylinder.

When the spindle head cylinder is working under feeding pressure, the table cylinder is working under holding pressure and vice versa. The change from feeding pressure to holding pressure is obtained by dogs which operate light switches.

A master pattern or cam, the exact size and shape of the finished work part is mounted rigidly to the bottom of work table. A guide pin, integral with the spindle head, extends upward under the table to contact the periphery of the master cam. Location of this mechanism beneath table avoids errors caused by chips and dirt.

When the machine is put into motion, the guide pin traces around the periphery of the master cam. Its motion is guided by maintaining the cam and guide pin in contact by means of changes from feeding pressure to holding pressure from point to point in its path as required by shape of the pattern being profiled.

Cutter spindles are individually motor driven. Vertical adjustment is provided on the spindles to allow for slight variations in tool adjustment. The tapered guide pin is adjusted vertically by a graduated dial to compensate for cutter wear.

Force feed lubrication is provided to all bearings and slides.

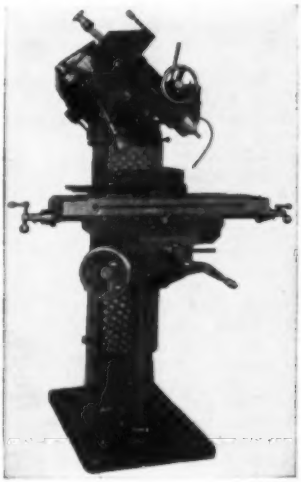
The work table carrying the holding fixtures and the master profile cam is of ample proportions to accommodate large fixtures. Keyways and Tee slots are provided for locating.

Millmaster Vertical Milling Machines

The DeLuxe Model No. 2½ Millmaster is shown with spindle head in swiveled position. In addition to 180° swivel of the head, the unit also provides adjustable throat length. On machines set up for three pulley operation, the head can be extended about 3" with standard length ram. On two pulley operation with standard length ram, the head can be extended about 7". Special long rams and V-belts are available—also special long T-slot bolts and spacers.

The units are provided with a one h.p. ball bearing motor and reverse controller at no extra cost.

All collars on table hand feed screws are calibrated for vernier adjustment. Spindle head is calibrated in degrees at point of swivel. Spindle main and pulley bearings are preloaded duplex oversize ball bearings. All bearing surfaces are oil cup lubricated. Flat and V bearing surfaces are scraped against master plates and entire alignment is checked against master gauges.



Offering an extremely wide range of operating speeds, (from 70 to 10,000 r.p.m. with three pulley operation), the Millmaster is very versatile and adapted for work in metals, wood or plastics.

The table is 9" x 34". Table vertical feed is 30" maximum, by telescopic screw. Maximum longitudinal feed is 18", by Acme lead screw. Transverse feed is 10" by Acme lead screw.

Spindle is machined for No. 9 B&S taper. ¾" draw-in collet maximum

IT'S EASY TO CUT GRINDING COSTS

WITH Mall TRADE MARK FLEXIBLE SHAFT GRINDERS

Check These ECONOMIES

- ★ Cut Power Costs
- ★ Cut Labor Costs
- ★ Cut Production Time
- ★ Less Fatigue for Operator
- ★ Power Available in Any Position.

MALL 3524-D ¾ H. P. Grinder. Other Models ½ H. P. to 3 H. P.

MALL flexible shaft machines will quickly demonstrate these major money saving advantages on any metal cleaning or finishing job. They are easily wheeled right up to the work—operate from any regular electric current outlet and eliminate the need for frequency changers and costly compressed air.

A constant speed, aluminum frame, dust and vaporproof or ventilated type motor delivers a steady flow of power through the heavy duty flexible shafting to the working tool—thus placing 2 to 3 times the power in the operator's hands with a minimum of weight. The same power unit can be used for SANDING, WIRE BRUSHING, POLISHING, DRILLING and GRINDING due to the interchangeable attachment feature of these working tools. There's a MALL grinder for every job!

Write for full information. We are manufacturers of the largest line of flexible shaft sanding, polishing and buffing equipment in the world.

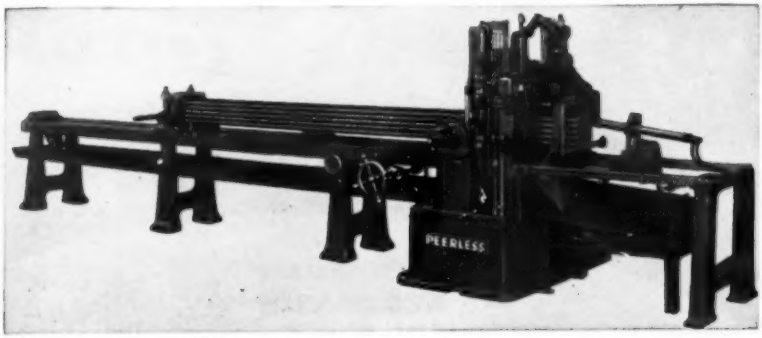
MALL TOOL COMPANY

7742 SOUTH CHICAGO AVENUE CHICAGO, ILLINOIS

capacity. ⅛" to 3" end mill capacity. Movable quill has 5½" vertical travel, with fast lever feed and slow worm drive with hand wheel — micrometer adjustment and hand lock lever.

Midway Machine Co., 2324 University Ave., St. Paul, Minn., are the manufacturers.

Hydraulic Metal Saw Establishes Record



A report recently received by the Peerless Machine Co., Racine, Wisconsin, reveals a striking record of performance of one of their machines in use by a large manufacturer who desires to remain anonymous. The job in question concerned the cutting of 16 bars of 1-⅜" diameter S A E—1010 steel at one setting of the hydraulic saw. The machine was set at 100 S. P. M., with a feed pressure of 160 pounds, using a six tooth high speed steel hack saw blade.

The first cut was completed in 6.5 minutes on the 16 pieces and the cut was parallel within .005". In the same work and using the same saw, the 82d cut was made in 6.65 minutes with the same accuracy on the finished work. Briefly stated, the saw had made 82 cuts through 16 stacked bars and the 82d cut was stated to be as accurate as the first.

Analysis of this report reveals that, with a remarkably close degree of accuracy, the stock was cut at the rate of approximately 3.7 square inches per minute — fast time considering the extreme accuracy obtained. The 1312 pieces were cut with the same blade, indicating that the saw removed approximately 1955 square inches of stock.

The machine responsible for this performance record was the Peerless 6" x 6" high duty hydraulic metal saw, equipped with hydraulically operated bar feed and including an automatic multiple vise, special automatic length gauge (capacity 0 to 36"), automatic stock support and stock chute, and 20 feet of conveyor. The conveyor was equipped with a heavy sheet metal coolant drip pan for its full length. This pan is now standard equipment on this particular Peerless machine when it is arranged with automatic bar feed.

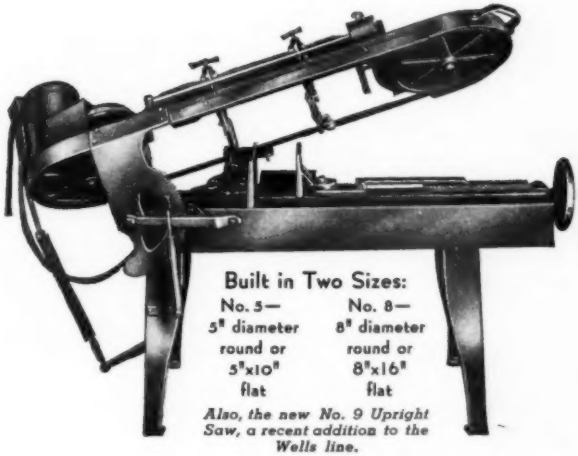
The special stock chute for the delivery end of this machine was also equipped with a sheet metal coolant drip pan to take care of work being cut off in lengths from 0 to 36".

Accident Rates in Machinery Industry

The National Safety Council, 20 N. Wacker Drive, Chicago, announces its annual statistical report on accidents in the machinery industry.

The report shows among other things, the predominant causes of these accidents, and the companies which made the best records.

For FAST, ACCURATE METAL CUTTING . . .



Built in Two Sizes:

No. 5—	No. 8—
5" diameter round or 5"x10" flat	8" diameter round or 8"x16" flat

Also, the new No. 9 Upright Saw, a recent addition to the Wells line.

WELLS BAND SAWS

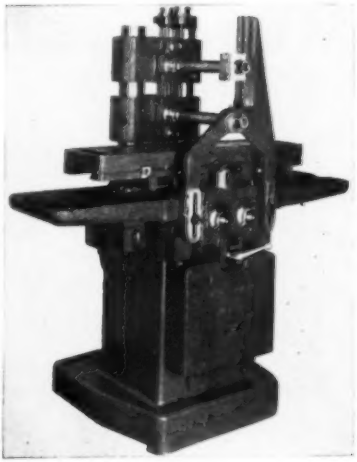
YOU'RE probably stepping up production schedules—if you are, you need all-around metal cutting band saw. One that can handle bars, sheets, tubes, angles—cut them quickly, clean and economically. The answer is a Wells Saw. Let us tell you all about them. Write today!

WELLS MANUFACTURING CORP.
THREE RIVERS • MICHIGAN

WELLS METAL CUTTING BAND SAWS

K-O Double Spindle Milling Machines

Kent-Owens Machine Co., Toledo, Ohio, offers a new line of milling machines equipped with double spindles, especially suited for splitting bushings, milling slots in pistons and similar operations. They can be used on a wide variety of other parts where there are two or more surfaces spaced from each other, which can be milled to advantage with two cutters mounted on different spindles.

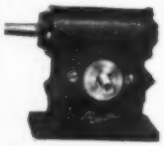


Two panel dials control the feed rate of the table from ½" to 80" per minute, the dial at left being used for fine feeds, while the right dial is for coarse feeds.

Spindles are adjustable vertically and independently by means of screws having micrometer dials. The center distance between spindles is 4-¾" minimum and 11" maximum. Center of lower spindle can be brought to within 1" of the table surface minimum and the center of the upper spindle can be raised

HOW MANY PRODUCTION HOURS IN AN Abart SPEED REDUCER?

We frankly can't tell about the hours - - but we can show actual records of Abart Reducers in year after year service – with practically no maintenance expense at all. This means more power transmission profits and lowered operating costs.



1½ A and SA Unit Horizontal Worm Gear Drive.

Write for complete catalog.

GEARS - - - Made to your B/P or specifications only.

Let us quote.

Abart GEAR AND MACHINE CO. MANUFACTURERS OF Speed Reducers & Gears 4632 WEST 16TH ST. CHICAGO ILLINOIS

5000 SHAPES AND SIZES GROBET Swiss Files

Ask for Catalog WF.

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss Files. Ask also for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

GROBET FILE CORP. OF AMERICA 3 Park Pl., New York, N. Y.

to a maximum of 12" from the table surface.

Each spindle is adjustable horizontally and independently. This adjustment is 1-½" and can be accurately positioned by means of micrometer dials.

Spindle heads are supported on two ground cylindrical steel posts. Drive is from a standard foot mounted ball bearing motor, mounted at rear. The makers emphasize that the drive is extremely simple and free from chatter or vibration.

Machine is furnished complete with spindle drive motor, hydraulic pump motor, hydraulic and electrical equipment complete. It is equipped with a single spindle speed selected to suit the particular job.

The post mounting of the heads is said to provide unusual rigidity and it also permits a greater distance between spindle centers by using longer posts where this is desired for special jobs.

Though the illustration shows this double spindle arrangement applied to a Kent-Owens No. 1-14 machine, with 14" table travel and 32" x 9" table, it can also be mounted on the Nos. 1-M and 1-8 machines.

Lighting Dark Corners

For the machinist and tool operator who finds need for a closely spotted light in had-to-see places, a novel flashlight bulb extension has been developed. It brings light right to the object, even if the latter is in a restricted location. For instance, internal bores on a lathe or boring mill, inside of gear trains, down under ma-

H. O. BATES

NAME-PLATE STAMPING MACHINE

Write for latest catalog to Dept. H.

STYLE No. 1

$95.00

F.O.B. ELIZ. N. J

H. O. BATES

251-257 North Broad St.

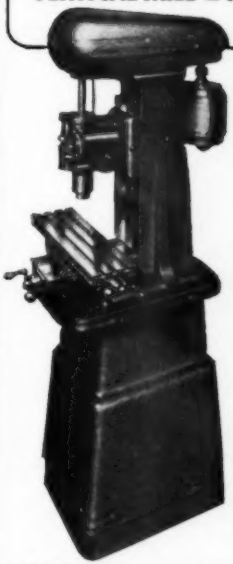
Elizabeth, N. J.

DIES CAN BE REPLACED.

YEARS AHEAD IN DESIGN

Vernon Combination

VERTICAL MILL & JIG BORER



The *NEW* VERNON VERTICAL

—with slow or rapid traverse to quill.

8 spindle speeds—range 250 to 4200.

Table size, 6"x21".

Maximum distance, Table Top to spindle end, 10"½.

Movement sliding head, 10½".

Vertical travel of quill, 3".

Longitudinal Table Travel, 12".

Cross Table Travel, 6".

Saddle Length, 11".

Motor, ½ h. p., 60 cycle, 1750 r. p. m.

A full ball-bearing equipped Tool of latest design. Embodies features of machines costing several hundred dollars more. 2-speed quill arranged for either compounded slow hand feed or one-to-one rapid hand traverse. For precise layout or jig borer work, machine can be equipped with dials and measuring plugs. Substantial pyramid pedestal. Streamlined design. As an extra, can be equipped with *Profiling Attachment for doing duplicating work.* A new tool that will quickly repay its low cost in any shop.

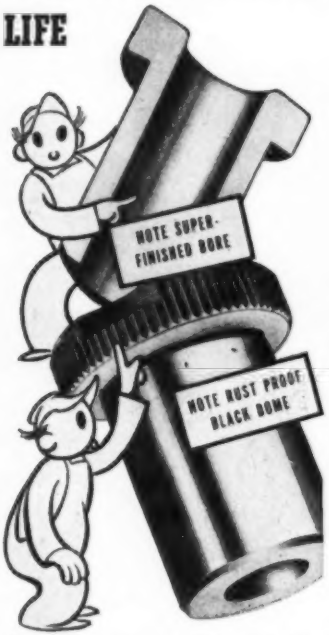
Write for Bulletin and price.

The Vernon Line of HORIZONTAL & VERTICAL MILLING MACHINES, JIG BORERS & 11" SHAPERS

MACHINERY MANUFACTURING CO.

P.O. BOX 155 VERNON BR. LOS ANGELES CALIF.

SUPER-FINISH BORE INSURES LONGER TOOL LIFE



Reduce your tool cost by using Universal drill bushings with super-finished bores straight and round within .0001. All standard sizes available. Write for facts.

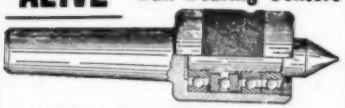
UNIVERSAL
Engineering Company
Frankenmuth, Mich.

chines, through narrow recesses, around corners, inside of equipment tanks, barrels, motors, etc.

Made in lengths from 6" to 36", the extension has a plug which will screw into any flashlight with a bulb in the socket on opposite end. Being bendable, it can go down into intricate mechanisms, even through a spark plug hole.

Known as the Sierra flashlight bulb extension, it is made of special wire encased in a high-grade aluminum alloy tubing. The device is made by the Sierra Aircraft Co., Sierra Madre, Cal.

"ALIVE" Ball Bearing Centers



"They turn with the work"
Write TODAY – and let us tell you more about them.
MODERN MACHINE CORP.
323 Berry St., Brooklyn, N. Y.

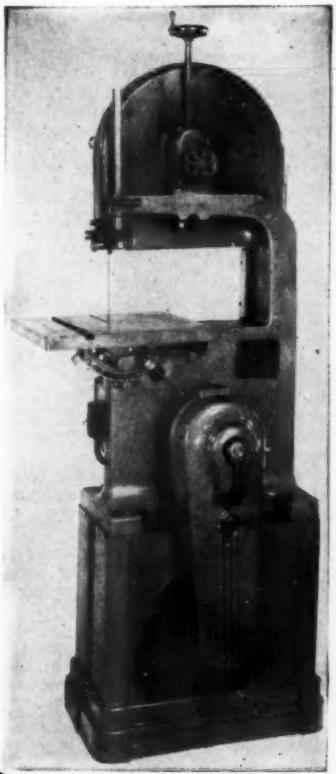
LOW FIRST COST!
OPERATING ECONOMY!
VERSATILITY IN SERVICE!

WALKER-TURNER

14" AND 16" Metal Cutting BAND SAWS

In service over many years for hundreds of the country's leading manufacturers, Walker-Turner Metal Cutting Band Saws have demonstrated their ability to save industry money.

Back-gearing and cone pulleys—similar to those found on a screw-cutting lathe—provide speed ranges on the 14" Band Saw of from 61 to 1950 S. f. m. with slow speed motor; 175 to 4630 S. f. m. with 1740 R. P. M. motor. Speeds slightly higher on the 16" model. Thus, practically any material from tool steel and other ferrous metals to aluminum and such non-ferrous metals, plastics and wood can be cut on these versatile machines.



PRODUCTION MACHINES BUILT BY PRODUCTION METHODS

Because Walker-Turner Band Saws are production machines built by volume production methods (as pictured below) to meet the nation-wide demand created by their exceptional versatility, they are sold at extremely low prices:

14" METAL CUTTING BAND SAW
$154.50
with 1/2 H. P. motor and base
Shipping Weight: 455 lbs.

16" METAL CUTTING BAND SAW
$180.50
with 1/2 H. P. motor and base
Shipping Weight: 575 lbs.

SEND THIS COUPON FOR FURTHER INFORMATION

WALKER-TURNER CO., INC.
1780 Berckman St., Plainfield, N. J.
Send more information on 14" and 16" Band Saws.

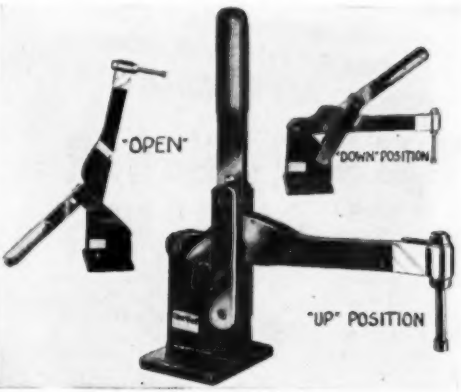
Name_____ Title_____
Company_____
Street_____
City_____ State_____

walker-turner COMPANY INC. PLAINFIELD N.J.

WALKER-TURNER MACHINE TOOLS
FOR METAL, WOOD AND PLASTICS

Knu-Vise Develops New Clamps

New developments in clamping devices are announced by Knu-Vise, Inc., 16841 Hamilton Ave., Detroit. The Knu - Kam - Klamp is made in two sizes, both interchangeable with the standard type No. 110 and the No. 250 toggle clamps. The action is similar to a toggle clamp in that they both have a clamping bar hinged at one end, the operating handle, and base member for attaching same to fixture. The link connecting handle to toggle bar is slotted to permit this bar to be withdrawn rapidly from the work, and plays no actual part in the clamping operation.



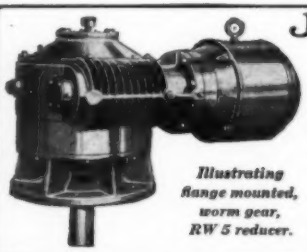
The upper portion of the toggle or clamping bar is machined to a cam surface against which two rollers are in contact at all times. When the handle is in the vertical position, these rollers contact the low part of the cam surface and the toggle bar is in the maximum position to take the thickest part being held in the fixture. Continued swinging of the handle forces these cam rollers against the rise of the cam so that the toggle bar is eventually in the minimum clamping position.

These clamps are now applicable to all phases of industry, as they do not suffer from the disadvantage inherent in a standard toggle clamp in that only one thickness of stock may be clamped at one set-up. The adjustment range is between 7/8" and one inch depending on the portion of the toggle bar used for clamping.

Several of these clamps have been sold to woodworking shops for mounting on the work bench, the adjustment permitting several thicknesses of wood to be clamped without having to change to set-up screw.

Remote Motor Control

A new system of electric remote control has been adapted to the U. S. Varidrive motor. It makes possible the automatic control of the take-off shaft speed by means of a thermostat, float switch or other control.



Illustrating flange mounted, worm gear, RW 5 reducer.

Janette Speed Reducers

43 Styles—1/50 to 10 H. P.—.08 to 1140 r. p. m.

Janette speed reducers are compact, rugged, pleasing in appearance, easy to install or maintain, reasonably priced, built complete and guaranteed by ONE organization. As adjustments and maintenance on belts, pulleys, chains, or slide rails are not necessary, delays in production can be reduced by using speed reducers. Better lighting is also possible, as overhead belts, pulleys, hangers and line shafting can be eliminated.

Ask For Your Copy of Our 100-Page Bulletin

Converters • Blower Wheels • Motor Generators

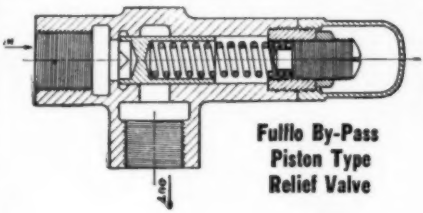
Janette Manufacturing Company

556-558 West Monroe Street Chicago, Ill. U. S. A.

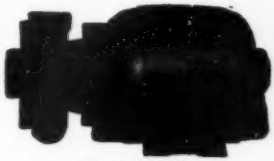
TRADE MARK "FULFLO" REG. U.S. PAT. OFF.

WHERE EFFICIENCY IS DEMANDED

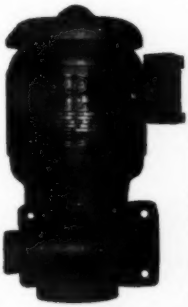
FULFLO PUMPS and VALVES ARE NEEDED



Fulflo By-Pass Piston Type Relief Valve



Symbol FHM Horizontal Type



Symbol FVM Vertical Type

These Units, Once Installed, Perform Their Duties Without Continual Adjustments or Attention, Regardless Of The Demands Placed Upon Them.

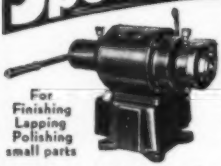
Your Coolant Problems Will Be Solved With The Use Of "Fulflo" Centrifugal Coolant Pumps And Hydraulic By-Pass Oil Relief Valves.

Our Complete Line Also Includes Belt Driven And Direct Connected For Motor Drive Pumps.

The Fulflo Specialties Co., Inc.

Blanchester, Ohio

SCHAUER Speed Lathes



For Finishing Lapping Polishing small parts

Production necessities; timesavers. Specially designed to handle finishing operations more speedily and at lower cost.

Write for circular No. 380.

SCHAUER 2064 Reading Road, Cincinnati, Ohio

GRANDAHL
Oil Dispensing
HAND PUMP

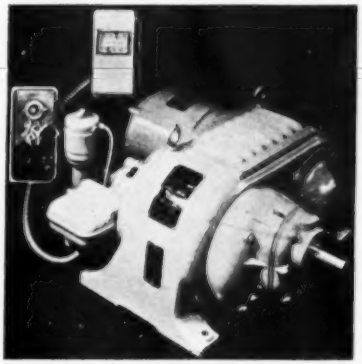
For clean, efficient handling of cutting oils, lubricating oils, alcohol, kerosene, and cleaning liquids.

Sturdy construction insures years of service.
Capacity — Six strokes per gallon.
Fits any standard size oil drum.
Recommended for machine shops and factories.
Price $4.00 f. o. b. Hartford, Connecticut.

Prompt delivery—Order Today

Grandahl Tool & Machine Co.
1280 Park St., Hartford, Conn.

It consists of a small worm gear reducer mounted on the Varidrive control case and connected to the control shaft which changes the speed. The pilot

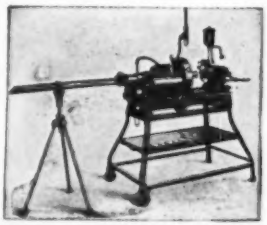


motor is operated by thermostat, float switch or similar control through a cyclic relay or process timer. The thermostat or float switch controls the direction of speed change while the cyclic relay governs the rate of speed change.

The system is finding wide usage in the ventilating and heating industries as well as in many other industries requiring automatic speed control. Full details are given in a new bulletin offered by U. S. Electrical Motors, Inc. Dept. 65; —80, —34th St., Brooklyn, N. Y.

Lake Erie Long Stroke Press

An unusually long stroke 150 ton hy-



ROGACO Portable Electric Pipe Machine

A Practical unit that cuts threads straight and true to gauge—operates from light socket—speedy and dependable in operation—low in first cost and operating cost.

Write for bulletins giving full information.

TRIPLEX MACHINE COMPANY
117 FOURTH ST., -:- PITTSFIELD, MASS.

MOTORIZE Machine TOOLS

for High Speed... Economical Production

The Turner Uni-Drive—the motorizing unit with FOUR-SPEED Selective Sliding Gear Transmission—is especially designed for installing on LATHES—SHAPERS—MILLING MACHINES—RADIAL DRILLS—BORING MILLS—HOBBING MACHINES. And the new Brown & Sharpe Drive for AUTOMATIC SCREW MACHINES which gives unlimited range and flexibility.

Write for prices and literature or see your nearest dealer. Dealers write—

THE TURNER MACHINERY CO.
1638 CENTRAL ST., KANS. CITY, MO.

The TURNER UNI-DRIVE

GENERAL TOOL & DIE CORP'N.
62 Franklin St.—E. Orange, N. J.

Specialists
on Solid and Tipped REXALLOY tools.

REXALLOY is most "universally successful" tool available to-day. As easy to grind and as tough as H. S. S.

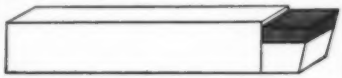
"AVERAGE INCREASE of 100% in METAL REMOVAL BEING SECURED OVER H. S. S. ON ALL TYPES OF METALS".

Best steel cutting tool ever developed —ONE Grade for all work—

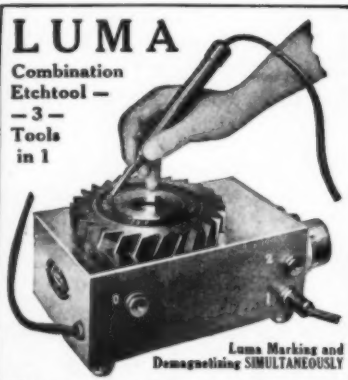
REXALLOY tools pay for themselves in one to two days.

Write for Our Circulars & Price List

Quick Delivery to all parts of U. S.



LUMA
Combination Etchtool — —3— Tools in 1



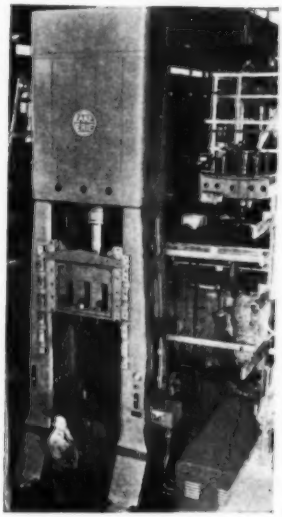
Luma Marking and Demagnetizing SIMULTANEOUSLY

Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details—5-day FREE TRIAL OFFER!

Luma Electric Equipment Co.
Dept. H—Main P. O. Box 132, Toledo, Ohio

draulic press specially designed for drawing cartridge cases has been built by the Lake Erie Engineering Corp., Buffalo N. Y. This press, with 108" daylight and 76" stroke is an interesting example of how hydraulic operation simplifies design of a press for meeting unusual requirements.



The press has a solid housing with gib-guided platen. Adjustable knockout bars are provided for other types of work, making this an all-purpose press.

Conveniently located pushbuttons control inching, semi-automatic and full automatic operation. Adjustable control of working pressure, as well as length of up and down stroke, contribute flexibility to suit various operations and save die setting time on original and subsequent runs.

Top of press is completely enclosed in removable panels. High speed pumping unit gives maximum production with fast approach and return of moving platen.

Here's why we say DURO DRILL PRESSES Are Superior

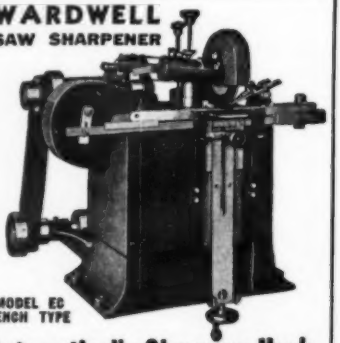
A quick glance at the illustration above *will not* show you why Duro Drill Presses are superior—BUT *take a few minutes to study and analyze their construction*—We'll leave the decision to you.

You'll find many features in construction that assures greater accuracy, greater strength and longer life at a very low cost. —To prove this, send for our catalog describing their construction in detail.

Made By
The Manufacturers of America's Finest and Most Complete Line of Power Driven Machinery.

DURO METAL PRODUCTS CO.
DEPT. BB8, - 2655 N. KILDARE AVE., CHICAGO, ILL.

WARDWELL
SAW SHARPENER



MODEL EC
BENCH TYPE

Automatically Sharpens Hack, Band & Circular Saws
with teeth as fine as 32 to the inch, at a speed of 30 to 75 per minute.
WRITE FOR CIRCULAR
The Wardwell Mfg. Co.
3165 Fulton Rd. Cleveland, O.

New Britain
UNIVERSAL VISE

Swivels 360 degrees horizontally, 100 degrees vertically, to give any angle or compound of angles.

Write for Further Information.

NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.

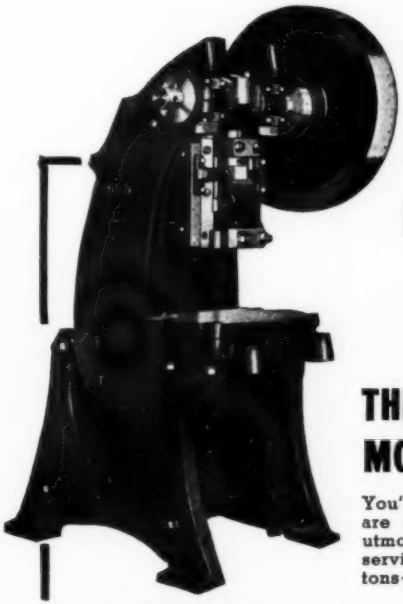
B&S Expands Auxiliary Equipment Line

Another piece of auxiliary equipment developed by Brown & Sharpe Mfg. Co., Providence, R. I., is an independent automatic cross feed arrangement for use on the No. 5 plain grinding machines (3" x 12" and 3" x 18").

It permits automatic straight-in-feed grinding, with the machine table stationary, giving the machine all the advanges of power plunge-cutting, with no change in its regular capacities or operating.

The arrangement provides 172 plunge-cut feeds or picks per minute, with the amount of feed adjustable by quarter-thousandths from .00025" to .0045" per pick. As with the regular cross feed, the stopping point can be set by increments of .0001".

A separately controlled 1/20th h.p. gearhead motor mounted at the right front of the machine drives continuously, a variable-radius crank mechanism, mounted below the similar unit regular a part of the machine. The arrangement includes a vertical link which transmits motion to the cross feed pawl from either of the two crank mechanisms. Selection of feed for traversing or straight in-feed grinding is made simply by connecting the link to the proper crank mechanism by



BETTER PRODUCTION

★

LONGER LIFE

★

THE MOST FOR YOUR MONEY

You'll like Marshalltown Presses for they are engineered and built to give the utmost in dependable, trouble-free service. Available in capacity of 5 to 70 tons—each one an outstanding value.

MARSHALLTOWN THE PRESSES

THAT *Have Everything!*

It will pay you well to get all the facts about Marshalltown Presses. Write today for literature fully describing them. *Gladly sent on request.*

MARSHALLTOWN MFG. CO.

900 E. NEVADA ST., MARSHALLTOWN, IOWA

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular

NIELSEN TOOL & DIE COMPANY
1859 Gardner Ave.
Berkley, Mich.

RED HEAD

ETCHERS and DEMAGNETIZERS

Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Magnetic Parallels and Midget Chucks.

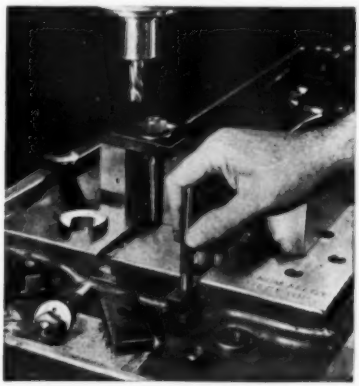
Send TODAY for latest circulars

PRINTZ ELECTRIC CO.
14595 KENTUCKY AVE.,
DETROIT, MICHIGAN

means of a machine screw and hardened bushing fitting either of two holes in the link. Amount of feed per pick of the pawl is selected simultaneously by means of a pointer and a scale on the rotating member before screw is tightened.

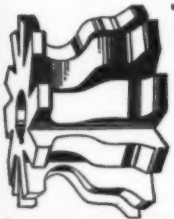
Gorton Safe-T-Slot Nut Sets

T-head bolts are commonly used in many machine tool set-ups. It remained for Gorton to develop a bolt with a removable head and it offers several very obvious advantages.



Faster set-ups are made possible because the nuts need not be removed from the T-slots. Studs are changed only for work of different heights.

It's a thrifty idea too because it is unnecessary to purchase assorted



MILLING CUTTERS
AND SPECIAL TOOLS

Made to order or converted from stock cutters.
1 to 3 days delivery.

By our special method we can save you $5.00 to $20.00 on special or converted cutters.

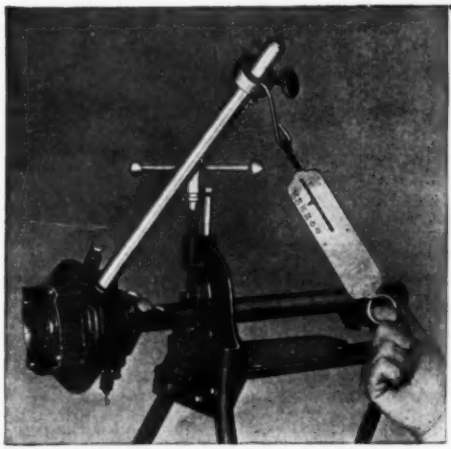
Centerless & Machine Parts Production Grinding.

MACHINISTS TOOL GRINDING CO., 2834 W. LAKE ST., CHICAGO, ILL.

You too can fit these into your Production Picture

They'll reduce your production costs. They'll speed up your output. They'll improve the quality of your finished product. Whether your requirements are for Drill Chucks, Tap Holders, or Die Holders; whether your screw machines are old ones or new ones, it's all the same when you use ALCO Tools. The exclusive floating feature enables you to count on perfect threads or perfect holes. Absolute concentricity is easily and quickly attainable—with a minimum of set-up time. The adjustment is simple yet positive. And, since ALCO Drill Chucks and ALCO Tap Holders are usable *without bushings*, you avoid bushing headaches and wipe out expensive bushing inventories. These points alone should prompt you to write today for *complete* information. The Alco Tool Company, 835 Housatonic Ave., Bridgeport, Conn., U. S. A.

ALCO EFFICIENT TOOLS



A "TOLEDO" SIMPACT DOES PULL EASIER

This simple "torque-test" proves a "TOLEDO" SIMPACT requires less effort to operate.

Deep-throated high speed steel dies that can be resharpened many times — and it requires but one set to thread all sizes from 1" to 2". Oil pockets drip oil on dies and pipe as thread is being cut. Handle is 24" long. Adjustable rear guide. Black crackle finish. Be assured of easy operation, long life and good threads —insist on a "TOLEDO" SIMPACT.

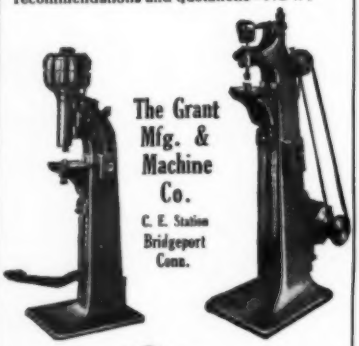
THE FINEST OF 1" TO 2" THREADERS

THE TOLEDO PIPE THREADING MACHINE CO.

TOLEDO, OHIO NEW YORK OFFICE, 72 LAFAYETTE ST.

CARROLL
Universal Dividing Heads
22 Years of Popularity. 6", 10½", 12" Swing. Right or Left Hand Type.

Rigid. Accurate. Long-Life.
WM. CARROLL & SON
1776 Lexington Ave., (Norwood) Cincinnati, Ohio

GRANT NOISELESS RIVETERS
Available in Noiseless Spinning and Vibrating Hammer types—also Vertical and Horizontal Multiple Spindle Spinning Machines.
You're invited to send unriveted samples for recommendations and quotations—NOW.

The Grant Mfg. & Machine Co.
C. E. Station
Bridgeport
Conn.
GRANT

lengths of T-slot bolts. All requirements are met with an assortment of inexpensive studs. The long surface on the nuts makes it impossible to score or gouge the insides of the T-slots on costly precision machines, or permanently distort table tops, which may happen when ordinary bolts are pulled up too tightly.

The tongues have a rust-resisting finish and are carefully gauged to size. Studs are of chrome molybdenum, with finished case hardened straps, washers and hex nuts.

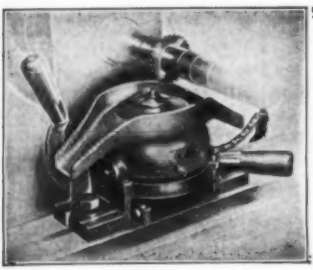
Four different sets are offered. No 689-1 is for ⅜" T-slots and contains four each of T-slot nuts, 2-⅛", 3-1/8", 4-1/8" and 5-⅛" studs, straps, nuts and washers, complete in a wooden box.

Set No. 688-1 is for ½" 8-slots with 3", 4", 5" and 6" studs. No. 796-1 is for ⅝" T-slots and No. 797-1 is for 13/16" T-slots, with 4", 5¼" 6½" and 8" studs.

The manufacturers are the George Gorton Machine Co., 1115 13th St., Racine, Wis.

BURR KEYSEATERS

Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.
Made in 4 sizes, for hand or motor operation.
Write for Bulletins and prices.
JOHN T. BURR & SON
429 Kent Ave., Brooklyn, N. Y.


Mill Over 1,000 Parts Per Hour
WITH THE
NEW Dearborn Automatic Chucking and Indexing Fixture
Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.
J. W. DEARBORN
72 S. CLIFF ST. ANSONIA, CONN.

Stainless Stampings

In selecting material for wing and fuselage coverings, as well as for other parts of all-metal planes, the advantages of stainless steel—high strength and excellent corrosion resistance have long been recognized.

Problems in forming and shaping stainless have limited its use somewhat. The metal's hardness and high tensile strength quickly wore out the punches and dies of the drop hammer machines.

It is reported that the development of Kirksite "A" for use in casting the female die required in drop hammer work, helped to solve many stainless steel stamping problems.

Using a Kirksite "A" female die with the standard antimonial lead male die or punch, it was found entirely feasible to produce such parts as exhaust manifold rings of stainless, up to a thickness of .05", without rapid wear of the female die. In fact, it soon became evident that the female die was not the weak link, but the male punch required frequent recasting.

The solution was found in casting both male and female dies from Kirksite "A". In small dies with no dimensions greater than about one foot, it is possible to follow the present casting technique developed for producing antimonial lead punches in making punches of Kirksite "A". A special technique must be followed for the larger jobs.

Kirksite "A" is a zinc base alloy developed by Morris P. Kirk Son, Inc., Los Angeles, a subsidiary of National Lead Co., 111 Broadway, N. Y. Full details are given in the Dutch Boy Quarterly, Volume 18, No. 2.

ONLY . . . . .

MOTO-TOOL

...has EXTRA SPEED and EXTRA POWER—

MASTER MODEL ONLY $16.50

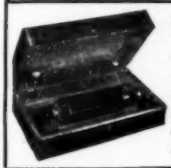
. . . . No other motor-in-hand tool is so packed with power. It allows precision work without the delay of removing and resetting larger tools. Used in hundreds of industries on hundreds of jobs. Sold by better dealers — on 10-day money-back guarantee. Catalog of Dremel equipment *free*. Write today.

- Operates at 27,000 r. p. m.
- Handles over 200 accessories.
- Has vibrationless, finger-tip balance.
- Has oil-less (oil-sealed) bearings.
- Has built-in cooling fan.
- Dust excluded by vacuum-cleaner type filter.
- Weighs only 13 oz.
- 110 volt—AC—DC

DREMEL MFG. CO.
DEPT. 210-H RACINE, WIS.

100 TOOLS IN ONE

GRINDS — CUTS — ROUTS — SAWS
POLISHES — SHARPENS — SANDS



MOTO-TOOL KIT —with 23 accessories . . . . points, carving cutters, saws, brushes, sanding disks, mandrels, chucks, etc.—only $23.50

SPEED UP NATIONAL DEFENSE
with KENNAMETAL TOOLS

Scores of plants producing airplane parts, tanks, guns, shells and other armaments are now speeding up production with KENNAMETAL tipped tools. Wright Aeronautical Corp., for example, specify KENNAMETAL on most steel cutting jobs in their Paterson, N. J. plant.

KENNAMETAL is also reducing machining time of parts for trucks, tractors, railroad cars, locomotives and other auxiliary equipment so vital to National Defense.

Let us show you how KENNAMETAL can increase your production of hard steel parts from 30 to 50% —with no additions to your present machine tool investment. There is no obligation—write today.

McKENNA METALS Co
135 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

30 DAY FREE TRIAL OFFER

Speed Your
PRODUCTION
with
WALTON TAP EXTRACTORS

Walton alloy steel "fingers", which fit the flutes of the tap, grip and back out the broken piece quickly, easily and without damage to threads.

World-wide acceptance for 32 years proves the value of Walton Tap Extractors.

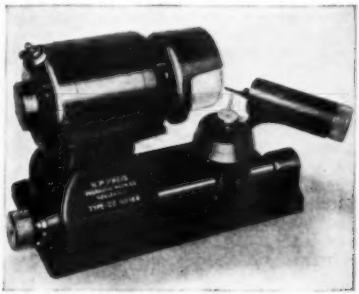
Stock sizes from No. 4 machine screws to 1½". in 2, 3 or 4-flute types.

Write for Circular 131. Select your sizes and put them to work at our risk.

THE WALTON CO.
95 Allyn Street Hartford, Conn.

Grinder for Engraving and Routing Cutters

A compact bench-type grinder for accurate sharpening of single-lip engraving and routing cutters is announced by H. P. Preis Engraving Machine Co., 157 Summit St., Newark, N. J. The machine, designated as the Panto Model CG, handles tapered-shank and straight shank cutters up to ¼" diameter.



The grinding wheel is of the cup type, 2-¼" diameter, and is attached directly to the shaft of a totally-enclosed ball-bearing universal motor, operating at 8500 r.p.m. The cutter-holding spindle is mounted in a swivel arm which is graduated for quick setting to any cutting angle or taper desired. Stop notches are provided for grinding three-cornered or four-cornered cutters. While cutter is rotated with operator's right hand, carriage is fed to grinding wheel by means of a feed-screw actuated with the left hand.

A solid spindle is furnished for users of tapered-shank cutters only, and a collet spindle is available for those using both tapered-shank and straight-shank types.

Mechanical grinding of cutters automatically insures correctness of angle, accurate centering of the point, and uniform sharpening, with resulting time saving, extension of life of cutters, and improvement in quality of work. It appears that this equipment will make these advantages available to shops

EASY TO APPLY

1 Clean Pulley Thoroughly

2 Tear Off Strips to Proper Size

3 Soak Strips in Clean, Hot Water

4 Apply Tightly and Allow to Dry

Have You Heard the Amazing Story of NONSLIP PULLEY COVERING?

"Production Increased 25%. Send 2 more Sheets."

"Nonslip has increased pull on our drill press over 100%. It surely took the slip out of our belts."

These are typical comments we are receiving every day from a fast growing list of customers including many of the nation's leading concerns.

Scientific tests show that Nonslip increases pulling power of plain iron pulleys 350%. Why lose this extra power and production when it's so easy, so economical to buy and apply Nonslip Pulley Covering.

Write for Complete Data

Send your name and address today for literature, prices, and our Unconditional Guarantee. Once you have tried *Nonslip*, you'll say it was one of the best power savers and production builders you ever used.

Manufacturers representatives: Write for territory.

NONSLIP PULLEY COVERING CO.
781 HERTEL AVE.
BUFFALO, N. Y.

This unit will drive machines from 1 h.p. to 5 h.p. Motor rails are adjustable for all sizes

MODERN-STREAMLINED
Gearshift Drive

PRICE $67.50
LESS BRACKET

SPECIFICATIONS:

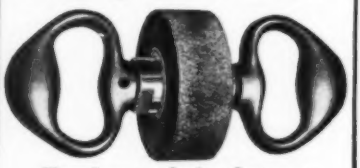
All steel heat-treated gears run in oil bath. Hand wheel for rotation of machine spindle. Instant reversability with all speeds. Adaptable for flat or V-belts. Speeds on 3 speed forward and 1 reverse unit—175-300-600 forward, 160 reverse. Speeds for 4 speed forward unit—135-175-300-600. Direct Motor Driven Units available from 1 to 25 h. p.

Write Today for more information.

The Lima Electric Motor Co.

440 N. Main St. **Lima, Ohio**

The Desmond
CRACKER JACK
Grinding Wheel Dresser



Has these exclusive features:

1. Full size 4" dia. wheel.
2. Dust protected ball bearings insure satisfactory bearing performance.
3. Handles shaped to protect users hands and give good grip.

The Desmond-Stephan Mfg. Co.
URBANA, OHIO
Canadian D.-S. Co., Hamilton, Ontario

WHEN BUYING
CUTTERS
look for the name

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest *quality* and *service* at *attractive prices.*

Write today for prices. *Few Territories Open.*

QUALITY TOOL WORKS
WAUKEGAN, ILLINOIS

whose sharpening requirements do not justify the installation of the larger and more expensive grinders.

Dimensions are 9-½" long, 4-½" wide, 6" high. Weight 13 pounds.

Miccrolac Protective Lacquer

A new coating material, known as Miccrolac, used to protect and beautify metal surfaces of either natural or plated finishes, has been introduced by the Michigan Chrome Co., 6340 East Jefferson Ave., Detroit, Mich.

One of the outstanding characteristics of this new material is its color, which approximates that of distilled water. In addition, it dries to a high lustre, and offers excellent qualities of adhesion, flexibility and abrasion resistance. It dries exceptionally fast—the type of coat applied for ordinary decorative work drying in only a few seconds' time.

Miccrolac provides excellent resistance to sulphur dioxide, sunlight, moisture (preventing rust) oil, grease, gasoline, and all commonly known chemical fumes. It does not blush even in the most humid weather.

A unique feature of the material is that it is not to be mixed with thinner as has been the usual practice with similar lacquers. It is used exactly as it comes out of the container. It is accurately adjusted for viscosity and total solids to insure uniform results. This eliminates chance of contamination during the mixing operation, and does away with guesswork and extra labor usually involved in adding thinner to the lacquer.

Miccrolac is furnished in one and five gallon cans as well as 50-gallon drums. It is applied by spraying or dipping. If desired, it can be brushed on small parts. Among its many applications are:—silver plated ornaments, trophies, etc., . . . polished brass or brass plated light fixtures, interior and exterior hardware and similar products . . . automobile hardware . . . copper, aluminum, wrought iron or stainless steel surfaces. It is an excellent material for protecting the finish on exposed metal surfaces of scientific instruments. It can be used on all types of metal mouldings.

Research

Calling for a billion dollar industrial research fund to create new jobs, industries, goods and services for "tomorrow." Dr. Karl T. Compton, President of Massachusetts Institute of Technology urges all companies in the U. S. to spend 2% of their gross incomes for research.

In all, 188 companies were surveyed last month by the National Ass'n of Mfrs. Advisory Committee on scientific research, of which Dr. Compton is Chairman.

While the results of the inquiry revealed that 10 companies spent over 10% of their gross income for research, the broad average of all the companies' expenditures was 2% — the figure which Dr. Compton believes would open new vistas of enterprise for the future.

If all the companies in the U. S. spent 2% of their gross incomes for research, Dr. Compton explains, the total would amount to more than a billion dollars a year, which would support probably five times as much research as is being done now.

In the research that has not been done, we may have missed many a nylon, neoprene, polaroid or even an automobile or refrigeration industry.

Dr. Campton points out that our future depends largely upon industrial research. Today's frontiers are in the laboratories and machine shops of industry. That is where the new jobs, new industries, new goods and new services of tomorrow must be created.

Although many companies have done a research job of which America can be proud, research remains one of the least developed resources of the nation. National defense needs make it particularly urgent in the months ahead, for America to lead the world in research.

★ Each GITS seal is designed to completely meet a specific temperature, speed and lubricant requirement—with the ultimate result and positive guarantee of long dependable service and materially extended bearing life. Learn true seal economy—send your specifications for GITS recommendations without obligations.

GITS BROS. MFG. CO.

1860 South Kilbourn Ave. Chicago, Ill.

30 years of oil cup experience

DON'T MAKE A FORMING DIE FOR 100 or 200 PIECES. FORM IT QUICKLY WITH THE

MICRO BENDER.

BENDS ROD, WIRE, TUBE OR STRIP STOCK

Ask your jobber or write:

O'NEIL-IRWIN MFG. CO.
310 8th Ave., So. Mpls., Minn.

Nedco Filler Rubbing Machine

A new 7" high speed heavy duty Model B sander has been developed by The Nedco Co., 87 Rumford Ave., Waltham, Mass.

The makers claim that it offers machine tool and other manufacturers, a speedier tool for filler rubbing on machine castings and bases, being quicker

and more efficient than hand rubbing methods. Providing just the right speed for the work, it is equipped with a special 6" rubbing pad and uses inexpensive sand paper discs.

The unit is powered with a universal motor, operating on a.c. or d.c., and is available for 110 or 220 volt circuits.

Weighing only 7 lbs., the machine is easily held in one hand, with the rubbing pad directly under the hand, giving easy and positive control, with practically no fatigue.

Each machine is furnished with a 20 ft. reinforced cord and the switch is conveniently mounted on the handle.

SHELDON

ARBOR PRESSES

12 sizes—¾ to 10 tons. Bench and Floor Models, Simple or Compound Leverage. Alloy steel rack and Gear.

Milling Machine
Drill Press and Shaper

VISES
Plain or Swivel—5 types.

Write for Catalog and Prices.
Dealers: Some Choice Territories still open

SHELDON MACHINE CO.
3257 S. Cottage Grove Ave., Chicago

Why Not Buy The Original Electric Etcher?

MARK IRON AND STEEL
THE ETCHOGRAPH WAY

New ELKONITE TIP pencil.
New Baby Grand Model at a lower price.

2,000 in use

WILLIAM BREWSTER & CO., INC.
42 Church St., New York, N. Y.

L-W DIVIDING HEADS

11″ Full Universal Dividing Head

Model AU

$175.00

Shipping Weight 190 Lbs.

FEATURING:

- New larger Worm Wheel.
- Ballbearing Worm Shaft.
- Larger spindle with full length tapered bearing.
- Threaded spindle nose.
- No. 10 B. & S. taper in spindle.
- Larger and heavier Headstock and Tailstock.

These L-W Dividing Heads are entirely NEW, and embody many new features and improvements. They are designed to give the utmost in accuracy, and stand up under many years of hard usage.

At our extremely low prices we are offering a Dividing Head incorporating all the qualities offered in dividing heads selling at a great deal more.

Investigate these New Dividing Heads TODAY.

11″ Universal Index Centers

Model BP

$115.00

Shipping Weight 120 Lbs.

L-W CHUCK CO.

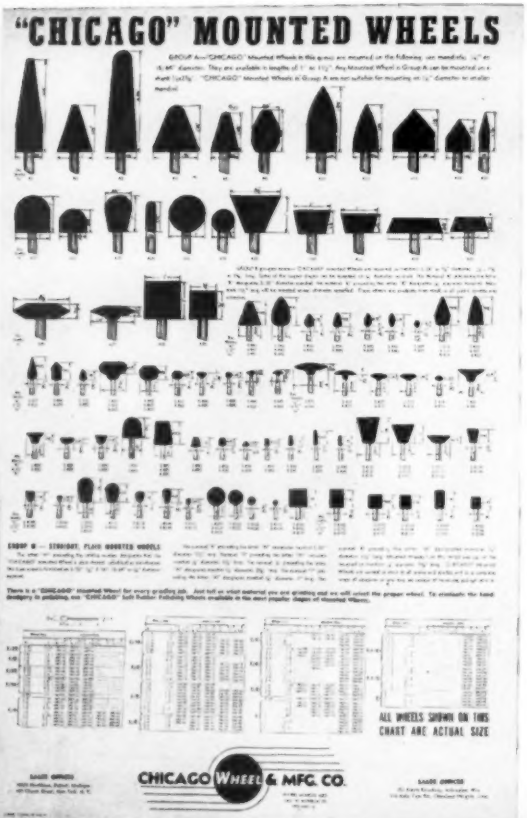
1-7 N. ST. CLAIR ST., TOLEDO, OHIO

CHICAGO MOUNTED WHEELS OF V/T SUPE

150% LONGER LIFE

Chicago Mounted Wheels made of the new V/T Super Bond prove by tests conducted in many plants on snagging and exacting operations to have from 150% to 300% longer life. They're tougher; can take more punishment; grind more pieces per wheel, faster and without sacrifice of cutting action.

V/T Super Bond holds its original shape longer. Wheel will not ridge on grinding welds, sharp corners, sinking dies, barbering, and other work of this character.



V/T Super Bond meets the challenge of today's exacting requirements. Cuts your grinding cost. Let us prove it to you in your own plant on your toughest mounted wheel job.

Let us send you one of these Mounted Wheels without cost or obligation. Tell us the kind of job, type of equipment and size you want to use to make your own test.

Complete Catalog Free upon Request.

FREE MOUNTED WHEEL CHART

Ideal for ready reference in the shop. A Wall Chart 22x15" showing actual size and shape of every standard Chicago Mounted Wheel.

CHICAGO WHEEL &

Makers of Quality Products fo

1101 W. Monroe St., Dept. HB

Canadian Distributors: Canadian Trade Corp., Ltd. 13

ER BOND

GREATEST FORWARD STEP IN 30 YEARS

V/T Super Bond is one of the most important developments in mounted wheels. Wherever the use of a tough, hard bond that will stand the gaff is required, V/T Super Bond will be found without peer. Nothing can compare with it in endurance, stamina and performance. There is a shape and size to handle every grinding job faster, better and at lower cost.

Chicago Mounted Wheels

✓ The FIRST small abrasive wheels mounted on steel mandrels to be offered to industry.

✓ The FIRST with this special new and exclusive bond—V/T Super Bond, unequalled in strength and long life.

HANDEE TOOL OF 1001 USES

Here's a small "power house" that can be carried to any part of the shop and used wherever there is an electric outlet. Repairs hard-to-get-at parts on machinery without removing the part—smooths off rough spots on dies and moulds—cleans delicate mechanisms—grinds, drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, cleans, etc. Uses 300 accessories. There are more Handees in use today than all other tools of this type combined.

De Luxe model weighs 12 oz. 25,000 r.p.m. $18.50 postpaid with 6 Accessories.

TRY A HANDEE FOR 10 DAYS IN YOUR OWN PLANT

HB-8

- ☐ Send Free Wheel. Size _____
- ☐ Free Wall Chart
- ☐ Catalog of Handee Products and Grinding Wheels.
- ☐ De Luxe Handee on 10-Days Trial.

Name _____

Address _____

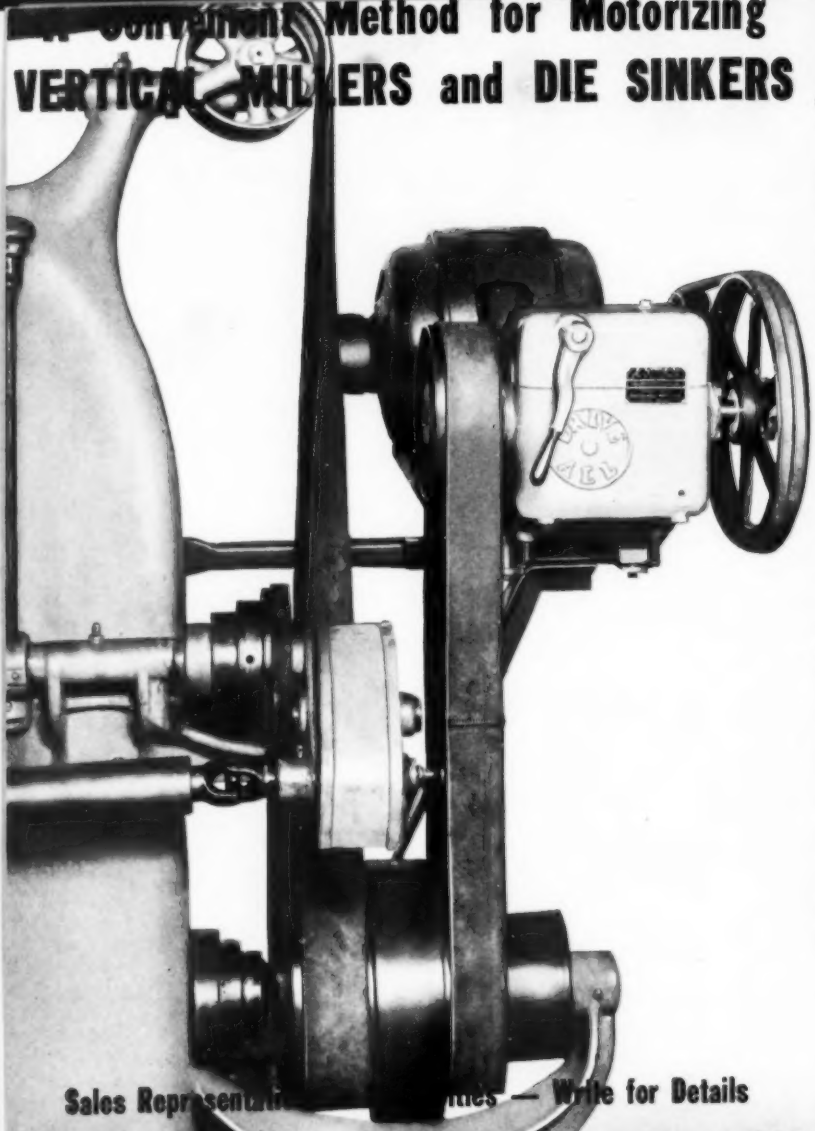
L & MFG. CO.

ects for 40 Years

ot. HB Chicago, Ill.

1332 Williams St., Montreal

Method for Motorizing
VERTICAL MILLERS and DIE SINKERS



Sales Representa... ...ities — Write for Details

MANUFACTURED BY

DRIVE-A... MANUFACTURING CO.

3401 CONNER AV... DETROIT, MICHIGAN

Photo-Drafting

A novel process of reproducing engineering drawings photographically, on nearly any kind of surface (metal, wood, cloth, paper, etc.,) is used by The Glenn L. Martin Co., Baltimore, Md.

The process, developed by the Martin Laboratories, is an important factor in the Company's mass production methods in the building of planes. It is expected to have wide application in other industries.

An heroic scale camera copies the drawings. The negatives are projected on large sheets of aluminum alloy, sensitized with a special emulsion. When such a sheet (maximum standard size is 5'x10' but it can be larger) is developed, the drawing appears on the surface in exact scale, or in fractional or multiple scales if desired.

Thus in a matter of minutes, drawings can be produced which might have required days in redrafting. On drafting alone, the company saved more than $80,000 last year. Engineering work is expedited. Tool designing and tool making get under way more rapidly and more accurately. Production preparation starts more promptly and changes may be made more rapidly.

For experimental planes, the master drawings are photographed directly on the metal of which the ship is to be constructed, and parts cut directly from this material itself. On miniature models, the camera scales down the lines instantly from full size to an eighth or a tenth or any other required fraction of the full size.

Besides projecting drawings, the camera copies typewritten or drawn pages, even half-tone proofs, onto metal plates. These permit rapid reproduction by the multilith method.

IT HAS EVERYTHING

From contact point to pointer, every detail of a Federal Dial Indicator has a very definite reason for the way it is constructed. New materials are constantly tested to determine if there is something better. New manufacturing methods are developed to improve the fidelity, sensitivity and accuracy of the instrument. At the right, the basic features which make Federal Indicators out-sell all others are listed. For design, construction and service, you receive the most from FEDERAL.

MOVEMENT—Complete Unit. Permits better alignment of rack and gears.

CASE—No screwed or soldered pieces to become loose or out of line.

BEARINGS—Federal was first to use jewel bearings. First to establish value of Full-Jewel, Low-Friction Indicators.

ACCURATE TEETH—All gears cut in our plant.

PRECISION ASSEMBLY—No watch is more carefully put together.

FEDERAL PRODUCTS CORPORATION, PROVIDENCE, RHODE, ISLAND

PRECISION MEASURING INSTRUMENTS

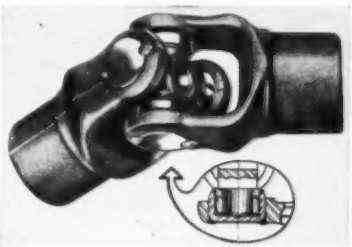
Chicago • Cleveland • Detroit • Hartford • Muncie
New York • Philadelphia • Pittsburgh • Rochester

A Sturdy Universal Joint

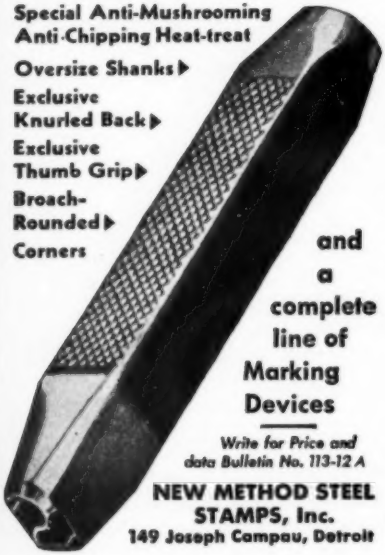
The Mechanics Universal Joint Division of Borg-Warner Corp., Rockford, Ill. offers a type CA roller bearing joint for power take off drives.

It was designed primarily for tractor steering columns but as it has a static torque capacity of 10,000 foot-pounds, it can also be used for many other drives and industrial purposes.

The joint is 5-½" long, with a swing



diameter of 2-¼" and is made entirely of heat treated steel forgings, accurately machined. It is of roller bearing construction with four roller bearings running on hardened and ground surfaces and fitted with cork grease seals which also operate against hardened and ground surfaces and are protected by being completely enclosed so that the seal is not exposed to any abrasive action. The completed joint weighs 1-¾ lbs.



Special Anti-Mushrooming Anti-Chipping Heat-treat

Oversize Shanks ▶

Exclusive Knurled Back ▶

Exclusive Thumb Grip ▶

Broach-Rounded ▶ Corners

and a complete line of Marking Devices

Write for Price and data Bulletin No. 113-12 A

NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau, Detroit

MODERNIZE present equipment with a RUSSELL BORING BAR. Bores 9/16" to 12" dia. with boring axis parallel to shank axis. One compact tool, with micrometer adjustment.

RUSSELL BORING BAR CO.
MIDDLETOWN, OHIO

Meet the Increasing Demands of Industry

by using Colwell Tool Post Turrets

13" Lathe Size

Save time and labor on repeat operations. Available for 9" to 20" lathes with a new "Midget" size for smaller lathes. Also furnished for turret lathes. Provides four positions. In operation it is fast, simple, accurate and dependable.

Write TODAY for your copy of bulletin.

S. G. COLWELL, 25 Congress Ave., Providence, R. I.

SMALL *but* MIGHTY

This Rousselle Punch Press

Meets your need for a modern, speedy, safe and efficient punch press.
This press is a money-saver, a time-saver, gives you absolute assurance of safety; and is built, primarily, for the small job.

The points of this NEW machine can be summed up in one phrase, "small but mighty". Consider just two of the several outstanding features. A Safety Automatic Knockout Bar—A Non-Repeating Clutch.

Your letter, requesting our illustrated circular and complete information on the new Horn Model, Rousselle Model No. 1 and Rousselle Model No. O, will be promptly answered.

DAVID J. ROSS COMPANY
BENTON HARBOR, MICHIGAN

Reclaiming Waste Materials Profitably

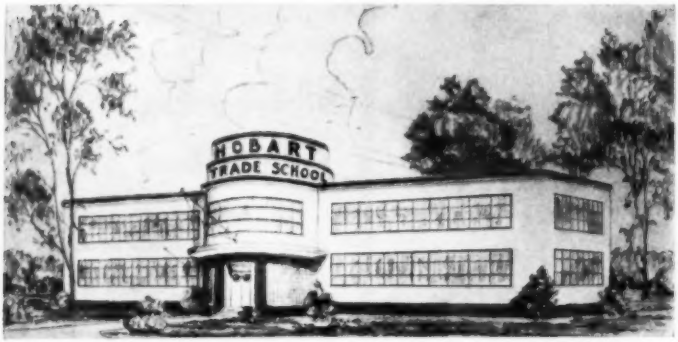
Wherever lubricants, fuel oil or other liquid substances are used in manufacturing or storage, there always exists the possibility of loss through leakage, drippings, and seepage, due to connections and pipe breaks which proves costly over a period of time.

Goodly quantities, irrespective of methods used, find their way into sewers and waterways causing waste and pollution.

Besides, many other substances such as coal, minerals, brass particle, etc., often become thoroughly mixed with water or some flowing substance and usually lost.

All these, plus the conditioning of the water, can be accomplished, so it is claimed by the Gale Conditioner made by Gale Oil Separator Co., Inc., Chrysler Bldg., New York City.

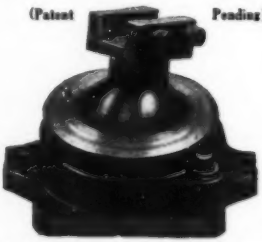
Hobart Inaugurates Trade School



Officials of the newly incorporated Hobart Trade School, Inc., operated by the Hobart Brothers Co., Troy, Ohio, have announced that plans have been completed for the erection of a new trade school building and construction is already under way. It will be a two-story structure with a frontage of 90 feet and a depth of 60 feet. The building will be constructed of all welded steel and can be enlarged at any time there is such a need in the future for expansion. O. H. Menke, president of the trade school, states the new structure will be ready for occupancy by early fall. The new school is expected to provide complete training in machine shop practice, electric arc welding and along other industrial and mechanical lines.

The Only **Universal Vise** *with a* **BALL JOINT**

(Patent Pending)



Quick, accurate settings can be accomplished on this Time-Saving Precision Instrument. Sizes range from 4", 6", 8" and 10" with 60° arc. Provided with flat plate for clamping work or holding on magnetic chuck.

Write for details.

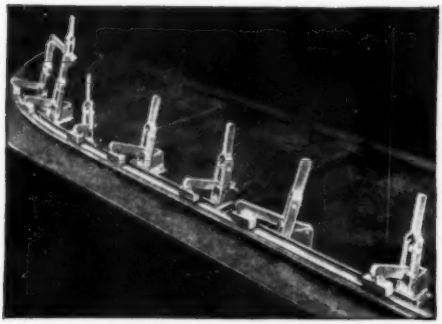
ENGINEERING SERVICE Inc.
12007 Linwood Ave., Detroit, Mich.

Optical Thread Tool Gauge

Rapid, yet highly accurate, set-up of single point threading tools is made possible by a new instrument, which serves also for checking tool and thread angles. It is made by The Gaertner Scientific Corp., 1201 Wrightwood Ave., Chicago and consists of a specially mounted microscope with an unusually large eyepiece field of ⅞". In this appear the characteristic angles of American National Standard, Whitworth, and Metric threads. The microscope, which has rack and pinion focusing, is mounted on a keyed cross-rod which slides for adjustment in a reamed hole perpendicular to a mandrel in the base.

For setting up the threading tool perpendicular to the axis of the lathe centers, the female centers of the instrument mandrel are placed between

Airplane Wing Parts Held in Position for Welding!



Another application for De-Sta-Co, quick-acting toggle clamps, the efficient method for holding parts during production, as for welding, drilling, reaming, machining or assembly operations. Many large plants now standardize on De-Sta-Co clamps; hundreds of small shops use them regularly. Complete line, all sizes. Send for Bulletin No. 40—illustrates clamps and shows uses.

DETROIT STAMPING CO.

Established 25 Years

3400 West Fort St., Detroit, Michigan

IMPROVE FACILITIES and SERVICE

WITH

"HALLOWELL" STEEL WORK-BENCHES

Fig. 732
Pat'd. and
Pat's. Pending
Drawer is extra.

Their one piece steel tops provide a permanently smooth surface, ideally suited for handling careful work. Yet heavy parts can be dropped on them without danger of splitting or splintering, and they'll never get oil-soaked and become a fire hazard.

"Hallowell" Benches stay firm always . . . flanged steel leg construction assures that. Furthermore, they can be taken apart and moved to a new location, if desired, and reassembled strong as ever. (Such a procedure with wood benches results in a pile of kindling.)

There are 1367 "Hallowell" Bench combinations available to fill your needs exactly and without delay. Prices lower than you think. Catalog gives details . . . send for it now!

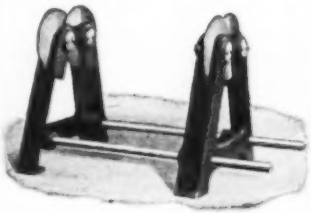
STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. BOX 650

— BRANCHES —

BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO

ANDERSON Improved Balancing Ways



Equip your shop with this accepted method of balancing rotating parts —checking, straightening and truing operations.

Anderson Improved Balancing Ways are simple, sturdy and dependable. They save time, effort and trouble—assure better work.

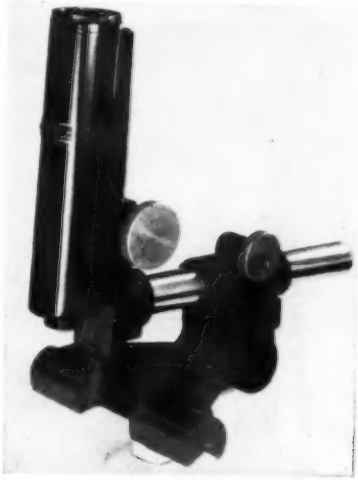
Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a prompt, sure indication of whether or not the work is in perfect balance.

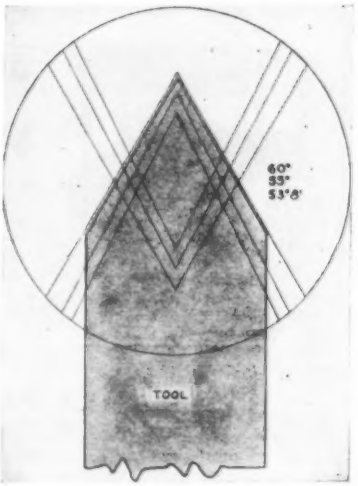
Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

Let us tell you more about this and other useful Anderson equipment. Your request will bring full details promptly.

Anderson Bros. Mfg. Co.
1907 Kishwaukee Street,
ROCKFORD, ILLINOIS

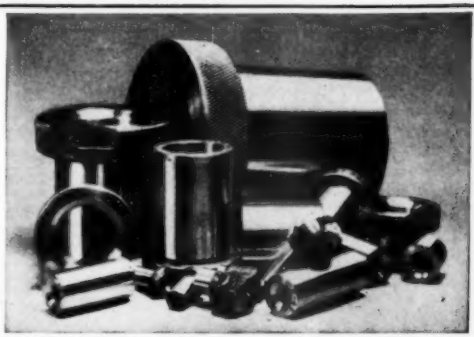
the lathe centers and the cross-rod is adjusted until the point of the threading tool is in the field of the microscope.





ACME

DRILL JIG BUSHINGS



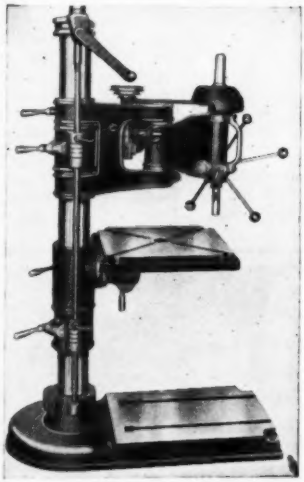
WHEN YOU NEED THEM

From our complete stock of A. S. A. and Acme Stds.

Prompt Delivery — Write for Catalog

ACME INDUSTRIAL COMPANY

210 N. LAFLIN ST., CHICAGO, ILL.



LOOK!

You'll find every worthwhile modern feature, plus low operating cost and reasonable first cost in this new DRILLMASTER Floor Model Radial.

Drilling to the center of a 36" circle, high speed production capacity is 3/8"— for ordinary work, 1/2".

The full floating spindle is ball bearing mounted, assuring free and sensitive operation at all speeds and loads.

The large tilting table may be locked at any angle. It is graduated 90° in both directions.

There are four spindle speeds—625—1250—2500—5000 r. p. m.

Send TODAY for bulletin describing the other attractive features.

WM. C. JOHNSON & SONS MACHINERY COMPANY

ST. LOUIS MISSOURI

The threading tool is then adjusted in the tool post until its outline coincides with the corresponding angle in the microscope. In this way, the thread tool will be set perpendicular to the lathe center axis within 2 minutes of arc. The angle of the tool itself is checked to the same accuracy.

To check thread angles on work, the gauge is simply placed on top of the work and the cross-rod of the instrument slid out until the threads appear in the field of the microscope. The accuracy is greater for small leads. A "V" is ground in the bottom of the mandrel of the instrument in order to facilitate setting it on the work.

The instrument is suitable for work from ⅜" to 6½" in diameter. Magnification is about 12X. It is supplied with a hardwood instrument case.

Air Gun With Hardened Steel Nozzle

A streamlined Air-O-Chek air valve, or air gun, with hardened steel nozzle for blowing service, where subjected to severe usage, is announced by the Air-Way Pump & Equipment Co., 401 S. Jefferson St., Chicago.

This steel-clad air gun employs the patented valve design, which requires no packing gland and no external levers or buttons.

An actuating lever, connected to the valve by a ball and socket joint extends into the hose. Flexing the hose slightly between thumb and fingers deflects the lever and opens the valve. When the hose is released, the valve closes instantly with a leakproof seal.

The simple valve mechanism is made of bar brass and stainless steel. It is shielded by the hardened steel nozzle and the hose.

Precision Collet Chuck

FOR portable tools, the accurate centering and bulldog grip of "Ericksons" increases working ease and speed and reduces drill breakage. The hardened nosepiece makes a handy stop, too.

Collet

Here's the ONLY collet which collapses 1/32" and maintains accuracy. It's open slotted at BOTH ends instead of only one.

Pat. Pending

Any size from No. 80 drill to ½".

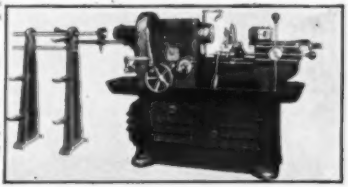
Chuck Shank can be made to fit any type spindle, Male or Female.

ERICKSON STEEL CO.
East 80th & Bessemer,
Cleveland, Ohio

THIS *NEW* TURRET LATHE
with
Infinite Spindle Speeds is designed to use modern high speed cutting tools. Motor driven—1" wire feed—6½" turning length

This NEW No. 2 Turret Lathe offers any spindle speed from 180 to 3600 R.P.M. instantly. It will handle a wide variety of work at low cost and is designed particularly for the use of modern cutting tools.

Send for copy of Bulletin No. 629 giving detailed information.



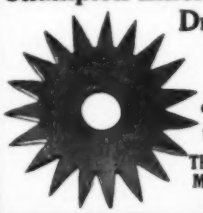
MOREY MACHINERY CO., Inc., 410 Broome Street, New York City

Stackbin Machinists Bench

All-welded steel construction is claimed to give the new machinist's bench, made by Stackbin, lifelong rigidity without periodic tightening. Originally designed to be used alongside

machines in the plant of a bearing manufacturer, the top is of ⅛" steel, shelves are of 14 gauge steel, and legs are of heavy angle steel. The bench is finished in baked-on, machine - gray enamal and can be equipped with a lock drawer, if desired. The size of the model illustrated is 20" x 24" top, 30" high, but the bench can be furnished in any size. It is made by Stackbin Corp., 48 Troy St., Providence, R. I.

Champion Emery Wheel Dressers and Cutters



(Superior in quality and design)

Write for Catalog

The Western Tool & Manufacturing Co.
Springfield, O.

ECONOMIZE . . . . MODERNIZE

with Modern Motor Drives

Accurate Cutting Speeds.

Completely Adjustable for Belt Tension and Pulley alignment.

Convert All Types of Cone Pulley Machines to Individual Motor Drives.

Increase and Improve Production—Cut Operating Cost 25 per cent.

Send for the folder "Modernize with Modern Motor Drives."

QUALITY HARDWARE & MACHINE CORP.

5843 North Ravenswood Avenue, Chicago, Illinois

SAROSTON LATHE GRINDER

Accurate for precision grinding—Sturdy for production grinding.

Three speeds—Use either end of spindle for grinding wheels — Sleeve type bearings — Sizes ⅛ to 2 H. P. *Write for details.*

THE SAROSTON CO.

251 Park St., Upper Montclair, N. J.

MADE OF ALLOY STEEL MILLED FROM BAR

SOCKET HEAD CAP SCREWS

SAFETY HOLLOW SET SCREWS

Try Them On Your Next Job!
Or Write For Samples Today.

ECONOMY MACHINE PRODUCTS COMPANY

5207 Lawrence Ave., Chicago, Ill.

A Tool Steel Manual

As one of the recognized bottlenecks in national defense is an acute shortage of tool and die makers, there is a high degree of interest in apprentice training and also in instructing skilled employees for supervisory work.

Some of the readers may be wondering where to turn for textbook material. A large number of vocational, industrial and technical schools have for some time been using as a text, "Tool Steel Simplified," written by Frank R. Palmer, Assistant to the President of the Carpenter Steel Co., Reading, Pa.

The book contains 315 pages of helpful information and sells for $1.00 per copy.

It covers such points as how to stop tools from warping; how to avoid grinding checks; how to make tools wear longer; how to make tools that will not break and how to be a troubleshooter.

Wood Workers' Catalog "G"

A new 48-page catalog "G" is offered by Woodworkers Tool Works, 220 So. Jefferson St., Chicago, Ill. It covers equipment for the pattern shop, carpenter shop and industrial woodworking requirements. Starting out with many different band saws, it includes jointers, surfacers, planers, combination woodworkers, radial saws, abrasive cut-off machines, metal cutting band saws, knife grinders, shapers, sanders and portable tools. Most of the items are illustrated and the descriptions are clear and concise.

— FAMCO —

ARBOR PRESSES **FOOT PRESSES**

Bench and Floor Models

A stock size and model for most every need, or a special press for your special requirements.

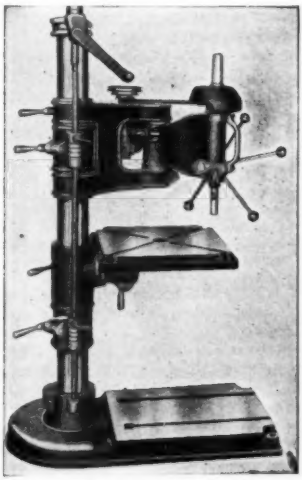
Send for descriptive literature.

FAMCO MACHINE COMPANY

1320 18th St. Racine, Wis.

"Drillmaster" Radials

A 1½ - foot radial known as the "Drillmaster" is distributed by the Wm. C. Johnson & Sons Machinery Co., 1211 Hadley St., St. Louis, Mo.



Maximum distance, table to spindle socket is 27"; base to spindle socket 40". Minimum distance, spindle to column is 5"—maximum 18", drilling to the center of a 36" circle. Spindle travel is 4". Spindle socket is Morse taper No. 2—Jacobs ⅛ to ½" chuck can be furnished at no additional charge. Machined surface on table is 16" x 16"—on base, 21" x 16". A ½ h.p. 1740 r.p.m. ball bearing motor drives the unit.

Dealers' requests for territory options are invited.

A Locknut With Novel Features

A new self-contained, one piece, all metal, locknut is announced by An-cor-lox Div., Laminated Shim Co., Inc., 64 Union St., Glenbrook, Conn. Known as the An-cor-lox locknut, it has several distinctive features appealing to builders of machinery. It is said to

No. 16 Toggle Punch Press

This is just one of the many types of presses that are manufactured by BEATTY. We are also the builders of various styles of Punches, Shears and heavy duty Machine Tools.

Send us your specifications.

BEATTY MACHINE & MANUFACTURING CO.

HAMMOND, INDIANA

TRICO OILERS

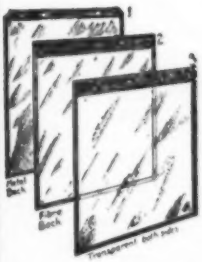
SAVE TIME—OIL—WORRY

No guesswork—bearing failures—waste—idle machine time—oil-soaked motor windings—fire and accident hazards, when you use TRICO OILERS. There's a type for every application.

WRITE FOR BULLETINS.

TRICO FUSE MFG. CO. Milwaukee, Wisconsin

Protect **Shop Orders, Drawings, Blueprints...**



with

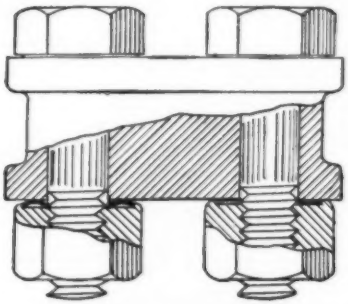
WADE Shop Envelopes

Any size or style to order, stiff or flexible, to suit your requirements.

Send for folder and quotation.

WADE INSTRUMENT CO.
1422 E. 109th St., Cleveland, O.

utilize a new locking principle that permits effective, positive, locking of the nut to the bolt, not to the work.

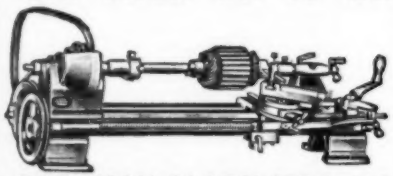


To apply, the locknut is simply spun on the bolt and drawn up to the desired degree of tightness. The nut locks itself automatically to the bolt. The arcuate or arch shaped metal locking ring contained in the bottom of the nut is expanded by the locking pressure into the root of the bolt thread and against the nut rim. This "lock joint" is claimed to hold securely under all heat conditions and vibration. No special length of bolt is required.

The makers assert that it does not damage the bolt thread or mar the surface of the work, and the same nut can be used time and time again without loss of locking effectiveness.

They are available in all standard sizes and in all metals, in standard packages, or in bulk in larger quantities.

New Model No. 40 ARMATURE LATHE



This NEW model Armature Lathe takes all armature and starter shafts. 26" bed, 18" cutting range, 6" swing. Take-up gibs and slide-ways machined to 60°. Compound swivels 360°.

Price complete in shipping crate $27.50

Write today for complete specifications

Can be used for light metal and wood turning.

ZOERMAN-CLARK MFG. CO., Inc., - Jackson, Mich.

Stainless Steel Castings

Among the improvements at the Buffalo Foundry of the Allegheny Ludlum Steel Corp., is a small electric melting furnace. It is of the tilting type, rotating around the hollow electrodes, similar to their larger furnaces which have been in operation for two years.

These furnaces are said to produce stainless steel castings which are remarkably free from blow holes and easier to machine.

The new small furnace will be used to meet the increasing demand for small stainless castings, such as impellers, mixing blades, spring supports and aircraft castings within a weight range of from ½ to 20 lbs. each.

The larger furnaces will be available for increased production of large stainless castings weighing several tons each, or more.

New conveyor tables automatically bring the flasks under the ladle and then move on down the line for cooling. This introduces the production line method of operation.

PNEUMATIC DIE CUSHIONS

Equip your presses for deep drawing work for as low as $50.00 complete.

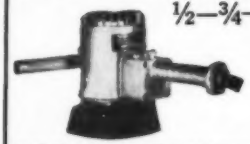
Write for Engineering Data on Deep Drawing Die Work.

DAYTON-ROGERS MFG. CO.

MINNEAPOLIS, - - - - - - MINN.

CUTS GRINDING COSTS

½—¾—and MORE



HEAVY DUTY

3 Phase
60 Cycle
No Brushes

GASTON POWER TOOLS
2655 W. 95th St., Evergreen Pk. Ill.

THE BETTER AIR VALVE

LEAK PROOF

Try the **AIR-O-CHEK**

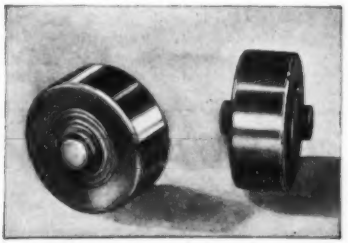
There's nothing like it. No packing glands. Leak-proof. Slight pressure between thumb and finger regulates discharge. No external levers. All working parts enclosed. Unique design. Many exclusive features. Leading factories have reordered thousands. Try it. Order sample on approval or write.

PATENTED MAY, 1939

AIR-WAY PUMP & EQUIPMENT CO.
401 So. Jefferson Street, CHICAGO, ILL.

A "New Departure" in Treadle Rolls

Because of the relatively short life ordinarily obtained with plain types of treadle rolls in loom service and because of their tendency to jam with

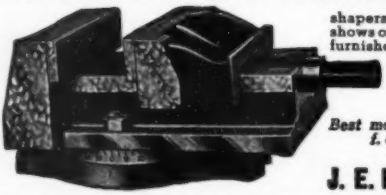


lint and damage the cams, New Departure has developed a special treadle roll ball bearing which overcomes all of these difficulties.

Made of high carbon chrome alloy steel, extra heavily built to absorb shock—completely protected from dirt or lint—fully lubricated for long life, shutdowns for roll replacements are practically eliminated. The bearing is easy rolling; cannot rub at the sides of the treadle arm, and the hard, smoothly finished surfaces do not become clogged with lint and dirt.

For further information, address New Departure, Div., General Motors Corp., Bristol, Conn.

PLUNKET IMPROVED VISES We make a complete line of modern vises for drill presses, shapers, milling machines and grinders. Illustration shows our standard milling machine vise as regularly furnished and stocked.



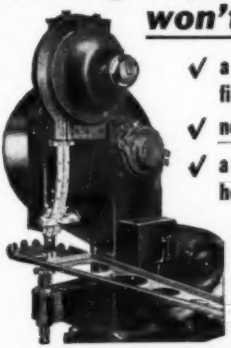
In ordering this vise give size of slot in table:

No. 1—6" jaws, 1½" deep, opens 5" wt. 45 lbs. $34.20
No. 2—10" jaws, 2¼" deep, opens 8½", wt. 120 lbs. 46.80

Best material and workmanship. Prices are net f. o. b. Chicago. Dealers' inquiries are solicited. Write for folder TODAY.

J. E. Plunket Machine Co., 1823 W. LAKE ST., CHICAGO, ILL.

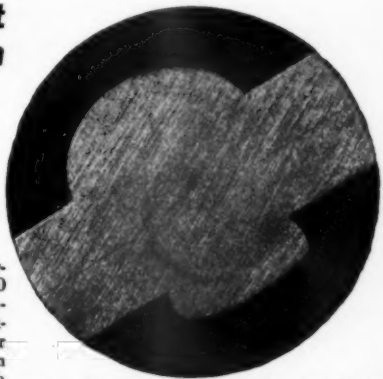
for rigid joints that won't loosen



- ✓ a completely filled hole
- ✓ no flashing
- ✓ a neat, balanced head

put in at an average rate of 1500 per hour. Approach to the maximum of 3200 per hour depends on the ease with which the work can be handled.

the RIVITOR



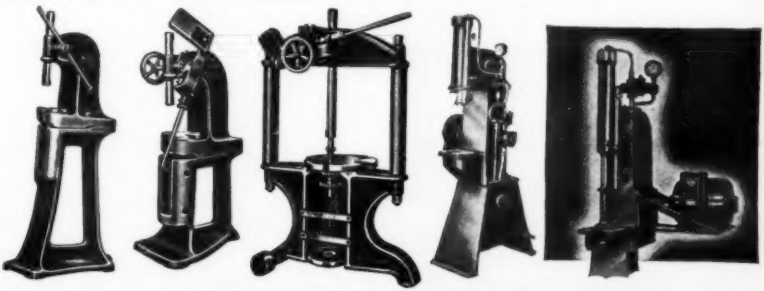
this is a ¼" rivet joint section enlarged. Send samples of your work to be "RIVITORed" to this preferred type of joint. No obligation, of course.

address The Tomkins-Johnson Co., 605 N. Mechanic St., Jackson, Mich.

this is a **TOMKINS-JOHNSON** *product*

BROACH *and* ASSEMBLE

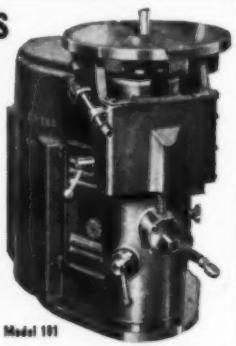
65 standard styles and sizes—manually operated presses from ¼ to 35 tons pressure—motor driven hydraulic presses from 1½ to 15 tons pressure. *Write for catalog F.*



GREENERD ARBOR PRESSES

NASHUA Est. 1883 NEW HAMPSHIRE

PETERS
VERTICAL OSCILLATING GRINDER



Model 101

The modern method of grinding and stoning tools and dies, permitting greater accuracy, quick job changes, perfection of finished parts and rapid production—with savings up to 80% in manufacturing costs. *Write TODAY for bulletins giving full information.*

PETERS TOOL CO., INC.
114 E. Scott St., Milwaukee, Wis.

Gatke Friction Material

New performance characteristics are said to have been achieved in a new type of asbestos friction material for brake linings and clutch facings, developed by the Gatke Corp., 228 N. La Salle St., Chicago, Ill.

The product is a combination of moulded and woven structures in proper balance to retain the best qualities of both.

It is claimed that this woven-moulded combination maintains a high frictional co-efficient with extraordinary uniformity under widely varying conditions of load and temperature.

Linings can be furnished to accurate dimensions in all shapes and sizes for brake and clutch requirements.

SUPERSET DIAMOND WHEEL DRESSER

- **ECONOMICAL**—All Diamond Stones used completely up without loss or resetting.
- **EFFICIENT**—Several Cutting Points in contact with wheel at all times.

1-CARAT DRESSER (16 stones per carat for wheel Dia. 6" to 12")
2-CARAT DRESSER (12 stones per carat for wheel Dia. 12" to 24")
4-CARAT DRESSER (8 stones per carat for wheel Dia. 24" to 36")

Send for Circular and Prices!

METAL CARBIDES CORPORATION
YOUNGSTOWN, OHIO

NUMBERALL
Numbering Machines
Automatic and Hand Operated
for stamping in Metal, Fibre, Plastics, etc. Do faster and better work than Single Steel Stamps.
For Marking Metal Parts, Name Plates, Metal Checks, etc.
Write for Catalog.
NUMBERALL STAMP & TOOL CO., Inc.
Huguenot Park, - - - Staten Island, N. Y.

Pullmore Clutches

New Sleeper and Hartley Spring Coiler controlled by Pullmore Clutch.

Score Another Hit

in Sleeper & Hartley Spring Coilers

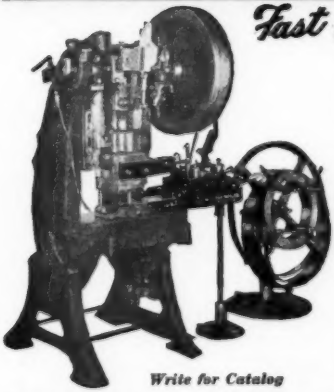
Used in other machines made by the same company, Pullmore Clutches again fill the bill in the new Sleeper & Hartley Spring Coiler illustrated. Accurately and ruggedly constructed, smooth in operation, Pullmore Clutches are unexcelled equipment for any high-quality machine. Reliable, durable, compact, Pullmore Clutches are readily and economically employed in a wide variety of applications. Pullmore Multiple-disc Clutches are made in single and double types, for operation in oil or dry, in capacities ranging from 1 to 75 h.p. at 500 r.p.m. Investigate. Write for the Pullmore Blue Book showing installations.

Rockford Drilling Machine Division *Borg-Warner Corporation*
410 Catherine Street, Rockford, Illinois, U. S. A.

Sold by MORSE CHAIN CO., Ithaca, N. Y., With Offices in Principal Cities

WITTEK ROLL FEEDS

FOR ANY MAKE AND SIZE OF PUNCH PRESS



Fast Safe Accurate Automatic

Keep up with production schedules, yet keep costs down by installing Wittek Automatic Roll Feeds—the feeds that have made automatic punch press operation practical on even comparatively short runs.

They can be installed on any make or size punch press without alterations . . . will handle any coiled stock and feed from right to left, left to right, back to front or front to back in any length from 0" to 24" per press stroke at catalog speed or faster.

Improved Operating Principle

Improved, simplified method of operation insures rapid smooth, accurate feeding. Made in 3 types, Wittek feeds save dies, reduce scrap and cut maintenance costs to a minimum.

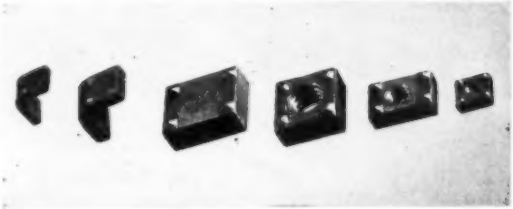
WITTEK ADJUSTABLE REEL STAND

6 types—a type for every job. Will handle any stock (metal, foil, paper, etc.) Wittek No. 3 (illustrated) has automatically expanding coil holders that center the coil and assure maximum production by eliminating looping, tangling and backlash of stock.

Write for Catalog

WITTEK MFG. COMPANY
4305 W. 24th Pl. Chicago, U.S.A.

Some of the new Welding Nut and Bracket Products, developed by Ohio Nut & Bolt Co., 616 Front St., Berea, O. They have solved problems in sheet metal product assembly where there would otherwise be insufficient stock for the thread.



MODEL NO. 16 "SPECIAL"

Constructed as per Specifications of U. S. Naval Aircraft Factories

Reg. U. S. Pat. Off.

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

Beware of Imitations! Our machine carries the Butterfly trade mark.

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired.

HARVEY MANUFACTURING CORP.

161 Grand St., New York

Phone . . CAnal 6-5170

Super Sight for First Aid and Precision Work

Magnification and light instantly

available where you want it, consisting of a magnifying lens and lighting

for your lathes **SENECA FALLS** *Automatic* **WORK DRIVER**

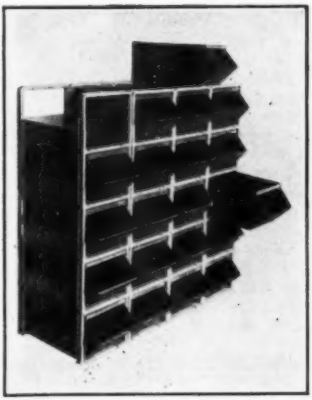
Self Centering . . . Quick Acting . . . No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N. Y.

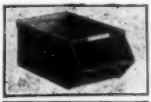
A STORAGE UNIT THAT

REDUCES HANDLING

OF PARTS AND MATERIALS



Because Stackbins are portable containers—not fixtures, parts and materials can be carried to departments, from machine to machine, or held in stockrooms without being transferred from one container to another. Stored in Stackracks, any Stackbin is instantly accessible when its contents are needed—without disturbing any other bin.



STACKBINS are individual hopper-fronted stacking bins, designed for storage, transportation and assembly.

STACKRACKS are individual units which lock together to form storage racks of any size, shape or capacity, into which Stackbins slide like drawers.

Stackbins in *Stackracks* offer a storage system that reduces handling, saves valuable space, and speeds work. Write us for complete details and low prices.

STACKBIN CORPORATION

55 Troy Street **Providence, R. I.**

"Stacked And Still Accessible"

Oliver Die Making Machines Should Be Included In Your "Preparedness Program"

They will relieve the pressure in your Tool and Die departments.

• • •

They will save 50% to 60% of the labor over hand methods on this work.

• • •

Their use permits less skilled help on many difficult jobs. FOR ALL SAWING, Filing and Lapping Operations. Send for full details.

Prices as low as $125.00

OLIVER INSTRUMENT CO., - 1408 E. Maumee St., Adrian, Mich.

Standard Since 1911

L&J

INCLINABLE POWER PRESSES

LOSHBOUGH-JORDAN TOOL & MACHINE CO.

1625 STERLING AVE ELKHART, INDIANA

unit is announced for industrial first aid and hospital use by The Boyer-Campbell Co., 6540 Antoine St., Detroit. It is moved about on a completely adjustable bracket and remains in whatever position you put it. It comes equipped with a mounting clamp so that it is readily attached to a chair or work table in a few seconds ready for use.

For removal of foreign bodies from eyes, of splinters from fingers, for drilling surgery, tendon repair, suturing, puncture wounds, eye treatments, etc.

This same unit of powerful magnifying lens and properly directed light is available on suitable brackets and in neutral colors for use in the shop, for close inspection use and precision work, adaptable to universal tool and cutter grinders, millers, shapers, lathes, etc. It enables more accurate work and also furnishes protection for the face and eyes.

Portable Electric Saw Handbook

An attractive new 24-page bulletin by The Black & Decker Mfg. Co., Towson, Md., contains much helpful and interesting information on the portable saw.

In pictures, the historical development of the saw is traced from the primitive man with his jagged flint or volcanic glass saw; the Egyptians with their inserted jewel saws; an early treadmill sawmill to the later water power mills.

Cutaway and sectional illustrations show the construction of the modern electric portables. Suggestions as to their use are given in large illustrations on several pages.

OTC GRIPOMATIC PULLERS

For PLANT MAINTENANCE

Capacities 5 to 50 TONS

Patented grip prevents slipping, avoids damage, eases work in close quarters. Alloy steel—guaranteed.

OTC PULLING SYSTEM includes many sizes and types. Pushers and Pullers to install or remove gears, bearings, wheels, pulleys, sleeves, shafts, etc.

Write for catalog.

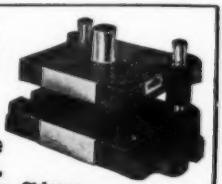
SPECIAL PULLERS designed. Ask us about your special tool needs.

OWATONNA TOOL CO.

355 CEDAR ST. OWATONNA, MINN.

DANLY DIE SETS

Precision Commercial Special



Danly Machine Specialties Inc.

2130 S. 52 Avenue Chicago

DANLY DIE MAKERS' SUPPLIES

ERRINGTON MECHANICAL LABORATORY

MAIN OFFICE AND WORKS: STATEN ISLAND, NEW YORK

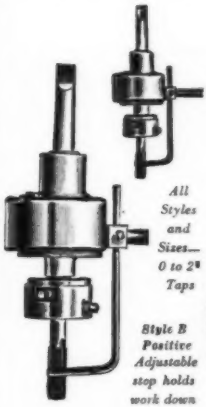
Chicago Office: 8422 N. RICHMOND STREET

New York Office: 200 BROADWAY

Boston Office: 830 OLD SOUTH BLDG.

CLUTCH OR CONE DRIVE

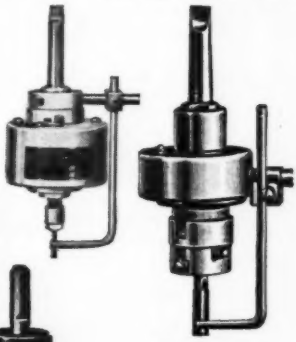
Our High Speed Tappers are Super-Sensitive for Small Tapping



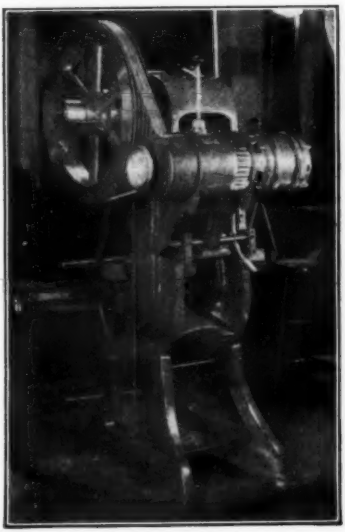
All Styles and Sizes— 0 to 2" Taps

Style B Positive Adjustable stop holds work down

Style D-E, Quick Change Tools



Style C Graduated Adjustable Safety Friction



MORE PROFIT

Speeding up production . . . faster and more flexible operation . . . quicker, easier control . . . these are just some of the things you gain with Schultes 4-Speed Motorizing Equipment . . . and they all spell MORE PROFIT.

A Schultes unit will mean Finger-Tip Control on your punch press, lathe, milling machine, shaper, drill press, etc. Instant selection of just the right speed for the job . . . dependable, economical and durable units that are easily applied to all your machine tools.

Write for bulletin giving full details.

Westlof Tool & Die Co.

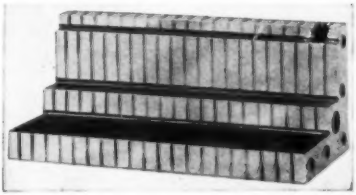
428 Bellevue Ave., Detroit

Universal Magne-Blox Angle Iron

The latest development in the Scherr line of Magne-Blox products is the new universal angle iron, designed for holding diversified work of all types in a magnetic cluck.

It consists of a series of steps measuring in width 3/16", 3/8", 1/2", 1-5/16", and 1-5/8" upon which may be placed all manner of special pieces for surface grinding without the use of complicated clamps and attachments. Over-all dimensions are 3" x 3" x 7½".

The device simplifies grinding straight edge sections without the use



of clamps, eliminates setting up time for grinding small pieces and may be used for grinding all four sides of a square. With the use of a sine-bar or a bevel protractor, work requiring grinding operations at various angles may be laid out and fastened to the side of the angle iron.

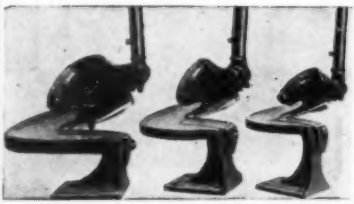
When placed on the plane surface of the magnetic chuck, the angle iron will actually form a magnetic right angle which is claimed to give the same holding power per square inch as the chuck itself.

The George Scherr Co., 128 Lafayette Street, New York, are exclusive distributors.

Adjustable Gold Stamping Machine

A new gold stamping machine has been developed by H. O. Bates, 251 North Broad Street, Elizabeth, N. J., and is now being adapted to numerous

Shearing Problems Solved



by using **BEVERLY SHEARS**

Model No. 1 weighs 16½ lbs., and cuts stock up to 14 gauge. No. 2 weighs 32 lbs., and handles up to 10 gauge. No. 3 weighs 55 lbs., and takes up to 3/16" mild or 10 gauge stainless.

Reasonably priced—send for descriptive circular

THE BEVERLY SHEAR CO.
3807 W. 110TH PLACE, CHICAGO, ILL.

GOOD NEWS!
for DIE MAKERS

Transfer Points Eliminate Guesswork in Die Making

There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in ¼" to 1" diameters.

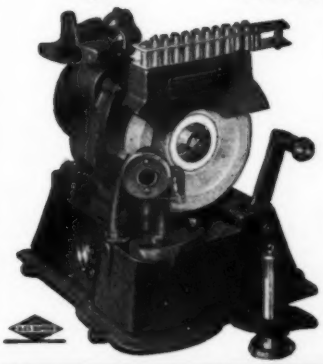
3/16" ..... $1.50 per set
1/4" ..... 1.20 " "
5/16" ..... $1.25 per set
3/8" ..... 1.35 " "
7/16" ..... $1.40 per set
1/2" ..... 1.50 " "

HEIMANN MFG. CO., URBANA, OHIO

Grind *Your* Drills On

"BLACK DIAMOND"

Precision Drill Grinder



Even an unskilled operator can do a precision job of drill grinding—handles sizes from No. 60 wire gauge to ¾"—easily, quickly and without any complicated adjustments. Saves time, drills and possible damage to the work.

Let us send you Bulletin No. 121-H.

BLACK DIAMOND SAW & MACHINE WORKS. INC.
NATICK, MASS.

NOW!

The REX Model

DYER SPOT WELDER

Built with the usual surplus of everything to maintain their high reputation for:

Strength
Sturdiness
Capability

Extra heavy transformer, horns, secondary, and steel cabinet construction.

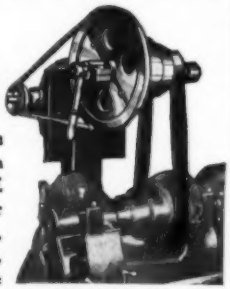
Adjustable lower arm
Quick — Positive

Send Today for Details

Dyer WELDER AND ENGINEERING Company

2727 Walnut St., Kansas City, Mo.

GUARANTEED FOR 5 YEARS



When you purchase a STEEGE Drive for your lathe, shaper, miller, etc., you're protected by our broad 5-year guarantee.

STEEGE Drives are easily installed—prices $35.00 up—sent on 30 days' approval. *Let us send catalog.*

W. L. STEEGE MACHINERY CO.
(Our 23rd Year)
548 W. Monroe St., Chicago, Ill.

LITTELL Air-Blast Valve for Faster Safer Production

PAYS its cost in a few weeks time in — increased production — greater safety — economy of air. Automatically ejects pieces. Operator's hands are never in danger zone. Quickly adjustable air nozzle.

Automatic Roll Feeds—
dial feeds, magazine feeds, hopper feeds, for punch presses. Reels for coiled stock. *Send for Circulars.*

F. J. Littell Machine Co.
4153 RAVENSWOOD AVE., CHICAGO, ILL.

numbering and marking jobs requiring a mark in color.

The machine will take a piece or part up to ¾" in thickness, but with the new adjustable construction, products up to 4" in thickness can be

stamped. It is furnished complete with heat control and six foot cord with plug for regular light socket.

Gold, silver, white, blue, red, orange and innumerable other colors can be stamped on the material, such as fibre, wood, leather, celluloid, bakelite, paper, and plastics, particularly compressed materials.

The machine shown was made for marking in gold, a number and code information on molded brake-block. Fixtures and adjustments for handling almost any type of product can be made on special order. Machine is furnished with either dies, interchangeable type, or numbering head with quick change holder.

The production with hand operation can be as high as 25 pieces or more per minute, depending upon the operator and the material.

A CLAMP for Every Purpose

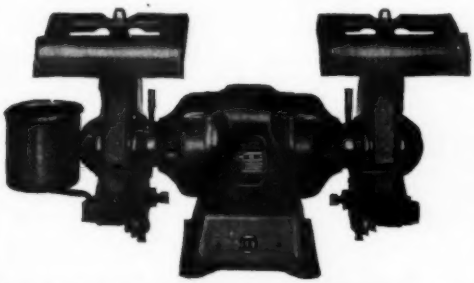
Forged Steel
Quick Acting
Deep Reach

Sizes Available:
¾" to 10' opening
½" to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co., 1945 WAVERLY AVE., CINCINNATI, OHIO



a Real Buy at $45.00

New BALDOR Grinder No. 724 has separate, combination lights and eye-shields; tool rests are tiltable and adjustable to and from wheel and up and down; water pot. ½ HP motor, 3400 rpm; 60 cy. 7"x1" ALOXITE wheels. Price, without bulbs, $45.00

2 YEAR GUARANTEE against BURN-OUT

The COMPLETE LINE of BALDOR Grinders (bench and pedestal types) described in BULLETIN 77. Ask for it.

BALDOR ELEC. CO.
4368 Duncan Ave.,
ST. LOUIS, MO.

BALDOR
BALL BEARING GRINDERS

MORE WAITING TIME
CAN BE WORKING TIME

Much of the waiting time of men and machines becomes producing time when "Budgit" Electric Hoists are installed to do the lifting wherever it is now done manually, or with chain blocks . . . They increase production, speed the work, and take all physical effort out of lifting, and earn their low cost over and over again out of savings.

"Budgit" Hoists come in 250, 500, 1000, and 2000 pounds lifting capacity with speeds to suit today's tempo . . . You can afford them! Prices start at $119, and there is nothing else to buy before you can use them. You simply Hang Up, Plug into the nearest electric socket, and Use!

Send for catalog containing complete information, also "Time Savings Calculator" that shows savings they earn.

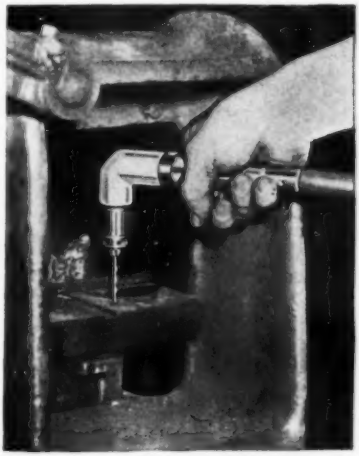
SHAW-BOX CRANE & HOIST DIVISION
MANNING, MAXWELL & MOORE, INC.
435 BROADWAY • MUSKEGON, MICHIGAN

Makers of all types and sizes of Electric and Hand-Operated Cranes and Electric Hoists . . . Send all your Crane and Hoist inquiries to Shaw-Box!

Portable Electric
"BUDGIT" HOISTS

Stow Offers a New Angle-Head

A close-corner, compact angle-head for use in drilling and filing with flexible shaft machines has been developed by Stow Mfg. Co., Inc., 30 Shear St., Binghamton, N. Y. The condensed



dimensions of the unit make it usable in very confined quarters. The overall dimension from the drill socket to the top of the case is only 2-⅛". From the spindle center to outside of cast is 9/16".

The unit has an aluminum housing containing two single-row ball bearings, back to back, on the vertical spindle, and a single-row bearing combined with a needle bearing on the

Automatic
Screw Machine Products
and
Metal Stampings
Send us your inquiries
Imperial Metal Products Co.
Estimate Dept. Grand Rapids, Mich.

horizontal spindle. With this equipment, high thrust capacity and assurance of husky performance are claimed.

With chuck that screws onto vertical spindle, the new angle-head accommodates drills, rotary, files, etc., up to ¼" shanks. For close work, short drills with 3/16" shanks may be inserted directly into the spindle and held by set screw.

"Toledo" Simpact Ratchet Threader

The Toledo Pipe Threading Machine Co., Toledo, Ohio, announce the new "Toledo" Simpact self-contained 1" to 2" ratchet threader. They state that this new tool cuts perfect tapered threads with minimum effort.

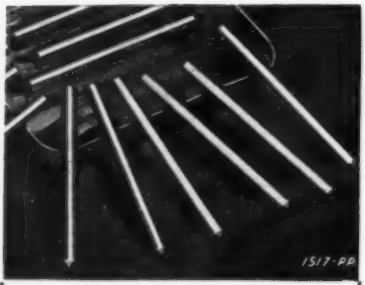
The Simpact uses high speed steel dies. These are changed from one size to another simply by pushing the size selector buttons and slipping the dies in the proper steps. This is claimed to save approximately half the time usually required for changing sizes. The dies are backed by tapered steps so that always smooth, long tapered threads are assured. A 3-jar rear gripping device is employed. It is equipped with three broad faced chuck jaws, graduated guide posts, and large wing-head thumb screws, for easy, positive accurate centering of the tool on the pipe. The 24" tubular steel handle is strong and light, and the tool is light in weight, yet no light weight die castings are used in its construction. The dies are deep throated and may be resharpened many times.

UNIVERSAL COLLET CHUCKS MEET YOUR needs

With a positive grip (as strong as solid steel) on either flutes or shanks Universal collet chucks are the ideal tool for holding drills, center points, end mills, keyway cutters, etc.

WRITE FOR FREE CATALOG

UNIVERSAL
Engineering Company
Frankenmuth, Mich.



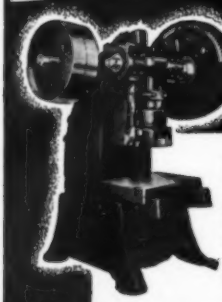
CUTTER BLANKS

Gorton hardened cutter blanks in both short and long sizes (from 1½" to 4") are available in both high-speed and special carbon steels. They are described in the new Gorton Accessories Catalog.

Send for your copy today.

George Gorton Machine Co.
1115 13th Street
RACINE, -:- WISCONSIN

FEDERAL PRESSES
are known for
EFFICIENCY AND QUALITY WORK



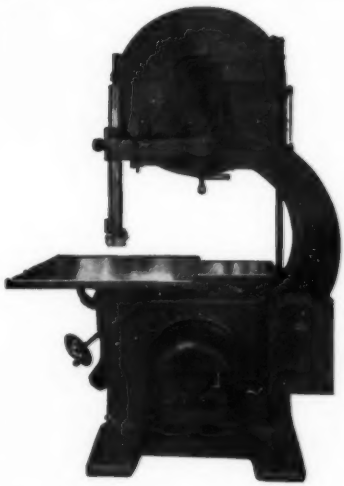
In Plants From Coast to Coast. It will pay you well to find out why.

Send for illustrated folder

FEDERAL PRESS COMPANY
ELKHART · INDIANA

Eliminating Band Saw Blade Hazards

Every band saw owner is aware of the possibility of injury to the operator of a band saw, as well as damage to the machine itself which may occur during the interval between blade breakage and stopping of the machine.



Better wheel guards and manually operated one-wheel brakes have tended to decrease this hazard to some extent, but during the few moments required to apply the brakes and stop the drive wheel, the whipping blade can inflict severe injury to the operator, gouge the tire faces and otherwise damage the equipment. The need for a greater factor of safety, particularly on band saws of the high speed type has been apparent.

The Tannewitz Works, Grand Rapids, Mich., have for some time been equipping their high speed models with hydraulic two-wheel brakes which operate automatically in case of saw breakage.

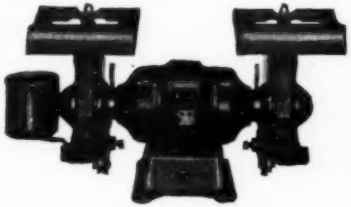
Similar in construction to the best of automobile brakes and perfectly synchronized, it is asserted that these

brakes automatically bring both wheels to a dead stop within an instant after saw blade breakage occurs, completely eliminating the hazard of a whipping broken blade. Details of this application are revealed in the following explanation: — The brakes are automatically applied when the current is shut off. This occurs in the case of saw blade breakage by means of a saw tension lever which snaps back the instant the breaking saw relieves the tension, pressing the switch button which automatically shuts off the current and applies the brakes.

Further advantage of this feature is to be found in the fact that both wheels may be stopped, instantly at will without throwing the least strain on the saw blade by means of the push button control at the front of the machine. This saves both time and saw blades.

Baldor No. 724 Grinder

The Baldor Electric Co., 4357 Duncan Ave., St. Louis, Mo., announces a new ball bearing grinder. It is designated as their No. 724 deluxe model,



7" grinder. It is powered with a ½ h. p., 3400 rp.m. motor, and is equipped with 7" x 1" Aloxite wheels. A particularly attractive feature of this new grinder is found in the shatter proof glass eye shields which accommodate a tubular light. This throws a ray of light on either side, and in front of the wheel without creating any annoying shadows. Other features include spark breakers, a water pot attached to the grinder, and a tool rest which is adjustable to and from the wheel, up and down, and which may be tilted for angle grinding. For further information, write the manufacturer for bulletin No. 77.

REPAIR CONCRETE to a TOUGH *Feather* Edge!

RUGGEDWEAR RESURFACER, made with cellulose, may be used for patching concrete or over an entire area . . . indoors or out. Stands up under the heaviest floor traffic. No chopping or chipping required. Merely sweep out the spot to be repaired—mix the material—trowel it on. Holds solid and tight right up to the irregular edge of the old concrete . . . leaves no joint or crevice to become chipped or filled with dirt. Provides a firmer, tougher, smoother, more rugged wearing surface. Dries fast. Costs only 10c to 14c per square foot. RUGGEDWEAR is the only Resurfacer made with cellulose. *Valuable, 60 page "HANDBOOK of BUILDING MAINTENANCE" sent FREE to those requesting on business letterhead.*

MAKE THIS TEST!

FLEXROCK COMPANY
2305 Manning St.
Philadelphia, Penna.

Please send me complete RUGGEDWEAR information . . . details of FREE TRIAL OFFER—no obligation.

Name .....

Company .....

Address .....

City ..... State .....

Thor Announces New Air Grinders

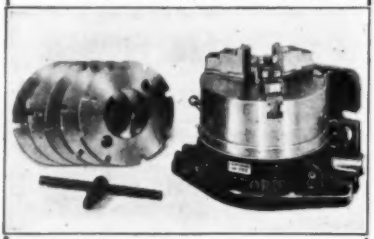
Based on the ingenious new "Air Behind the Blades" principle, a new Thor portable air grinder, the No. 255, is announced by the Independent Pneumatic Tool Co., 612 W. Jackson Blvd., Chicago, Ill.

The "Air Behind the Blades" keeps the rotor blades of the grinder out against the cylinder wall, preventing any "dead center" position or the depression of the blades in the slots due to oil accumulation. As a result, positive starting is assured under all operating conditions.

The new No. 255 grinder is but one of the complete Thor line, which includes an unusually complete range of 50 models and sizes for every type of grinding from snagging rough castings to finishing precision dies. There is a separate series of grinders for light, medium, heavy, and extra heavy types of production grinding, as well as small wheel grinders for the shop, laboratory, or work bench.

Some idea of the comprehensiveness of the line can be derived from the following figures:—Thor grinders range in weight from 18 ounces to 24 pounds; in length, from 5½" to 39"; in speed, from 3,000 to 21,000 k. p. m.; and in capacity, from 1½" to 8" diameter wheels.

FOR MILLING, DRILLING, SLOTTING, OR PLANING



FOR ONE PIECE— —OR FOR THOUSANDS

The HARTFORD "Super-Spacer" indexing fixture was designed to meet the demands of modern feeds and speeds. Its unequalled versatility fits it equally well for special work or for production jobs. Quick set-up—rapid, accurate indexing—elimination of error—greater rigidity—all these are yours in this new device.

Send today for complete information.

Hartford Special Machinery Co.
285 Homestead Ave., Hartford, Conn.

CLOSED TRADE AUTOM MARK CLOSED
OPEN Plain Type Offset Type OPEN
CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

AUTO MOULDING & MFG. CO.
2326 S. CANAL ST
CHICAGO

SPECIFICATIONS:
Open Width 3/8" to 6"
Gage Material .040 to .125
Pin Diameter .101 to 3/8
Lengths to 120"

THREE-FOURTHS OFFSET. SEMI-OFFSET

Model E Centrifugal Pump

The Eastern Engineering Co., 45 Fox St., New Haven, Conn., announces another Midget centrifugal pump.

It is said to be engineered to yield maximum volumes and pressures for the space it occupies and to be sturdily constructed for long-hour service.

It is particularly adaptable to installations requiring the pumping of thin liquids where weight and space must be kept at a minimum.

Maximum pressure is given as 20-25 pounds per square inch and maximum volume—8 gallons per minute.

It is 7-½" long, 3-¾" high, 3-¾" wide and weighs 6 pounds.

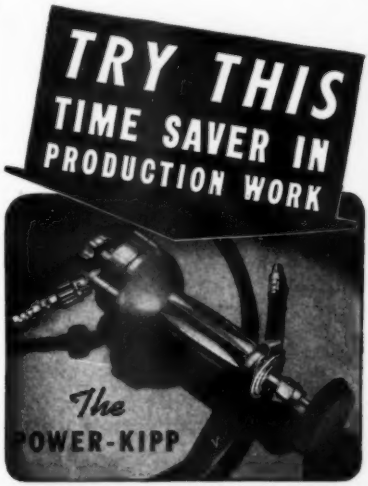
Motor is a universal heavy duty fan cooled, 1/20 h.p. 115 volts, a.c. or d.c.

Total internal volume of pump is 12 c.c.

Stuffing box is adjustable by means of hand-operated adjustment wheel.

Standardized Spot Welders

Standardizing on three sizes of frames, all bearing the same characteristics of design and interchangeable parts wherever possible, spot welding machines to meet a wide range of application are now manufactured on a mass production basis by American



KIPP air GRINDER

The Power Kipp Model VT, has a controlled speed of 12,000 R.P.M., takes wheels up to 2½" diameter, discs up to 4¾". Production executives find it a time saver in production work, as great as the high speed Kipp Air Grinders in Tool Room Work. VT sells at $58.75, other Kipp Air Grinders sell from $9.75 to $40.75, Chippers and Filers at $19.75. Kipp Air Tools give you highest speeds, lowest prices. New Catalog gives details.

10 DAY FREE TRIAL
NO OBLIGATIONS

☐ Send Power Kipp Model VT on your 10 day Free Trial Offer!

☐ Send the New Kipp Air Tool Catalog!

Name_____

Company_____

Address_____

MADISON-KIPP CORPORATION
207 WAUBESA ST., MADISON, WIS., U. S. A.

KOEBELITE
DIAMOND TOOLS

★

Deliver a Known Quantity—and Quality —of Service

★

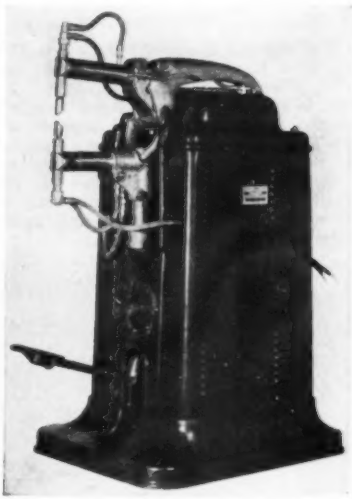
KOEBEL DIAMOND TOOL COMPANY
DETROIT

CHATTERLESS COUNTERSINKS

Severance countersinks are designed to take heavy cuts and at the same time produce an amazingly smooth seat. The cutting teeth are so arranged as to give a shearing cut and make chatter almost impossible. Special countersinks made in various combinations of angles, diameters, lengths, ball nose, double angle, and shank types and sizes.

Submit your problems with full particulars to our engineers or write for Bulletin No. 12-B.

Severance Tool Manufacturing Co.
1510 East Genesee Ave. - Saginaw, Mich.



Electric Fusion Corp., Diversey Avenue, Chicago, Ill.

Each of the three frame sizes is amply spacious to house either of two transformers. Thus, the BG type with 10 KVA. capacity also houses the 15 KVA. transformer of the BH type.

The medium frame carries either the 20 KVA. transformer of the BL type, or the 30 KVA. capacity of the BM type.

The large frame machine, in similar fashion, has ample space for the 40 KVA. transformer known as BP type, and the 50 KVA known as BR type.

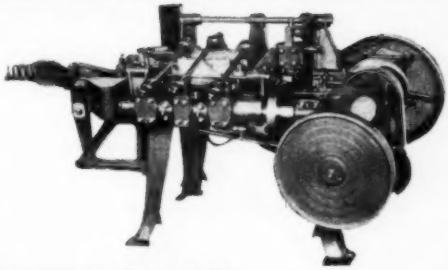
Thus, with only three frame sizes, the manufacturer has produced a standardized line of spot welders ranging in electrical capacity from 10 to 50 KVA.

Horn lengths for various throat-depths remain the only part of these welders to be added as orders are received and even in this, the most popular sizes are usually carried in stock.

Reduced production costs, due to this standardization program has, it is said, permitted price reductions on all standard spot welders coming within the scope of this series.

FOR HIGH-GEARED PRODUCTION

The NILSON AUTOMATIC Metal and Wire Forming Machine meets Today's industrial requirements. Engineered with a 50-year background of experience in designing and building metal forming machines, this S-3-F machine is setting new records in speed and uniformity of products.

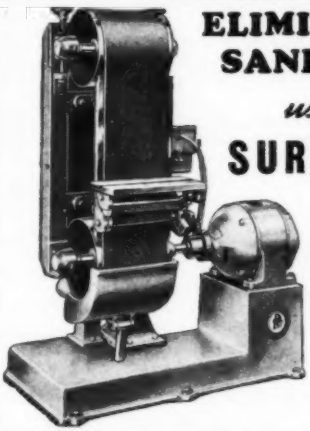


CHECK THESE FEATURES:

- Open construction of press and forming tools.
- Patented slide feed with an independent cam-operated wire gripping device.
- Power operating wire feed is transmitted through a straight line.

Write TODAY for information on all types of metal forming machines

The A. H. NILSON Machine Co.
BRIDGEPORT, CONN., U.S.A.



ELIMINATE COSTLY HAND SANDING AND FILING— *use a* PEERLESS SURFACING MACHINE

In many instances, a rapid cut on a Peerless may eliminate an expensive milling or planer operation. Much costly hand sanding and filing may be eliminated through the use of these machines. The advantages of a straight-grained finish and the economies in time and material resulting from use of the abrasive belt method warrant careful consideration of Peerless Surfacing Machines. 4" to 20" width of belt. Vertical and Horizontal. Also Reed High Speed Sensitive Drills.

May we send you a bulletin giving full details?

PRODUCTION MACHINE COMPANY
GREENFIELD, MASSACHUSETTS

MOORE'S

SMALL
SET SCREWS

Headless to ½ - 13 — Square Heads to ⅜ - 16 and Dardelet

PIPE PLUGS: ⅛" and ¼" Headless, Square Heads and Hollow Heads.

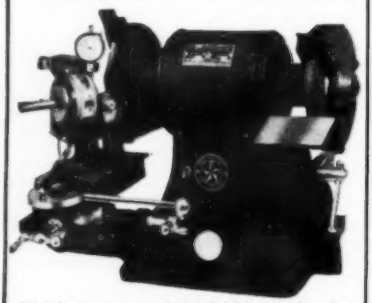
GEORGE W. MOORE
44 Farnsworth St., Boston, Mass.
For 60 Years Mfrs. of Quality Screws

Neilsen Transfer Sets

A new method of transferring screw and stud holes as well as blind drill holes from a drilled surface to another that is to be drilled in duplicate has been perfected in the Neilsen transfer screw and punch sets now

available. Layout punches for the use of tool and die makers, machinery builders, erectors and machine repair shops are made to transfer drill holes through a drilled section in diameters from 17/64" to 59/64". The punch is made with a case hardened tip that is removable for replacement. When a

Precision Drill Grinder



Simple to operate—dependable—speedy—this Precision Grinder will enable you to produce perfect joints on standard twist drills in sizes from No. 41 (.096) to ⅝" (.625).

Send today for more details.

Star Machine & Engineering Corp.
Division Star Electric Motor Co.
Bloomfield, - - - New Jersey

ALL ALLOY PORTABLE SHEARS

FULLY GUARANTEED

Two Sizes

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to ¼" steel plate.

Special Blades for shearing stainless steel.

BREMIL MFG. CO.
1720 Pittsburgh Ave., Erie, Pa.

solid blow is struck on the punch head, it will transfer the drill center and drill circle with complete accuracy. This method is an extension of the procedure used in transferring blind screw and stud holes through the use of Neilsen transfer screws. Many economies are claimed for its use, amongst these are availability for either new or old work; layout marks cannot be lost because of drill or drilling fluids erasing a layout made with dividers. Center and drill circle penetrate steel to a depth of 0.010". Transfer screws are made with a shoulder support of uniform height enabling holes of various sizes to be transferred in the same plane at one impression. The savings claimed are said to amount to 80% of the cost of transferring holes by older forms of operation. Full information is available from the Neilsen Tool & Die Co., Berkely, Mich.

Fluorescent Lamp Guide

"Fluorescent Lighting," a practical guide to the application of Mazda F lamps and equipment, has been published by Westinghouse.

The 23-page booklet explains how the lamps work and the whys and wherefores of auxiliaries. Answers are given for the many questions every lamp and lighting man is asked today about d-c operation, temperature effect in outdoor operation, color, stroboscopic effect, radio interference, and lighting costs.

Illustrations of installations, wiring diagrams, and tables of essential technical data are used throughout the book. Current-limiting devices, starters, lampholders, and other auxiliary apparatus are discussed in detail.

The new book tells briefly where, why, and how Mazda F lamps should be applied to achieve the better lighting that these new sources make possible.

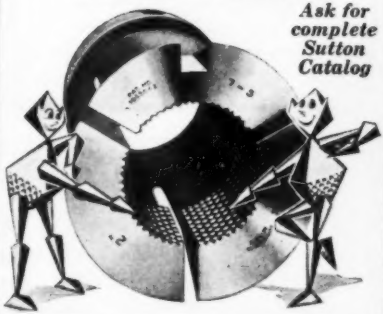
Copies of booklet A-3618 may be obtained from department 8N48, Westinghouse Electric & Mfg. Co. East Pittsburgh, Pa.

And the Right Angle

will let you buck the waves without swamping..... Sutton DIAMOND-GRIP Collets have both these features. Their Diamond-shape serrations attack the cutting thrust at an angle and grip tighter under less tension. They'll help your screw machines ride all production waves.

Sutton DIAMOND-GRIP Collets

Ask for complete Sutton Catalog



SUTTON TOOL COMPANY
2895 W. GRAND BLVD. DETROIT, MICH.
Accessories for Screw Machines

KNOCK-OUT Reamer and Cutter Grinder

Repeat orders from prominent manufacturers are convincing testimonials.

A machine in a class by itself

With this Universal Tool you can do any tool grinding job within its range, including Carbide tools, at a big saving in time.

Ask for bulletin No. TG408H

K. O. LEE & SON CO.
Aberdeen, So. Dak.
KNOCK-OUT
"practical tools for practical men"

Drive-All Develops New Mounting

The Drive-All Mfg. Co., 3401 Conner Ave., Detroit, Mich., has developed a new method of mounting their motorizing units on hand screw machines, lathes, and similar equipment.

Until now it has been customary to use a large main supporting bracket extending from the bed of the machine to a point above the pulley to be driven. This method of mounting has certain advantages and will continue to be offered as optional equipment, but the new rear mounting, recently developed, offers an entirely new appearance in motorizing equipment.

There are no projecting parts above the machine to obstruct vision, and when belts and cone pulleys are guarded, the machine presents the appearance of a new, factory-built, motor-driven machine. Adjustment is provided for all belts and an extra pulley can be added to the input side of the gear box to drive the coolant pump. The handle for shifting from one speed to another is conveniently located on front of the machine by means of an extension shaft.

The Company has received many letters from leading industrial users, asserting that motorizing units raise the production of machines on which they are mounted to such an extent that the units are self-liquidating within a few months, thus increasing profits for the user.

A good one for DRILL PRESS
Often used on Miller, Shaper, Planer

Fig. 2. Without Jig Attachments

Send for Circulars

VISE

Jaws 6", 9" and 12" Long

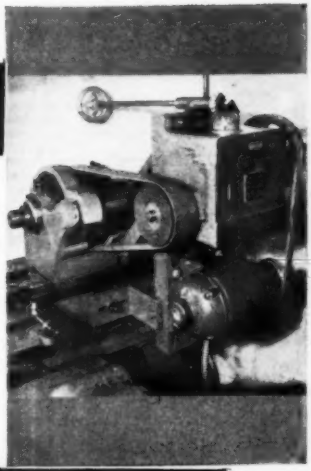
Much drilling. Small Jig cost.

Fig. 1 With Jig-Attachments.

THE GRAHAM MFG. CO.
70 Willard Ave., PROVIDENCE, R. I.

Modernize with

FLEXOID SPEED CONTROL



A Revolutionary 4 Speed Control Unit

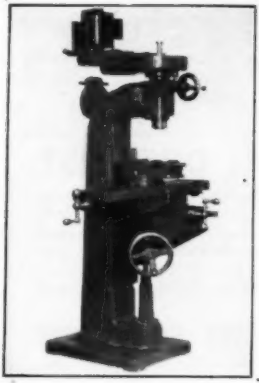
The Flexoid 4 speed control combines all the advantages of motorized control for machine tools in one compact, fool-proof, self-contained unit. A single hand control —at remote position if desired—operates all ratios with neutral position between changes. All hardened gears... ball bearing ... parallel input and output alloy shafts... rigid, solid construction ... all housed in one case ... motor mounted on unit. Write for descriptive data and prices.

The Smith Power Transmission Co.

410 LAKESIDE AVE., N. W., CLEVELAND OHIO

TOOLMAKERS DELIGHT *in using this* NEW INDEX No. 40-H

Hard Work Becomes Pleasure—Difficult Jobs Easy



It Mills slots, keyways, cavities, irregular curves with end mills 1/8" to 5/8" diameter in tool steel.

It Drills to accurate locations without lay-out.

It Bores up to 3" holes in steel—vertical, horizontal or at angles.

Has Verniers for locating 8"x16" at one setting.

Write today for full details.

Blank & Buxton Machinery Co.,

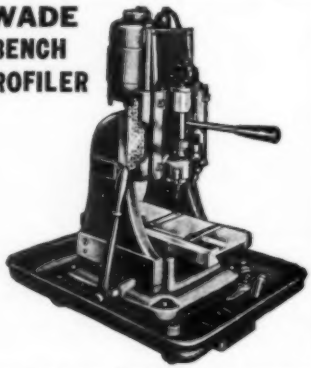
Jackson, Michigan.

TANNEWITZ
Abrasive Cut-off Machine

Uses Abrasive Wheels or Saws, and instantly swivels and cuts any angle from 45° left to 45° right, doing clean, instantaneous work on metal bars, shapes or tubes.

THE TANNEWITZ WORKS
Grand Rapids, Mich.

WADE BENCH PROFILER

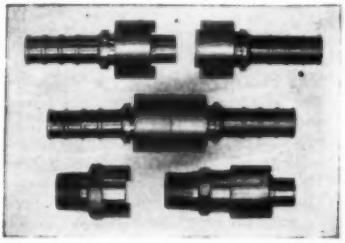


For rapid production in recessing and slotting operations.

WADE TOOL CO.
WALTHAM, MASS.
ALSO WADE BENCH LATHES AND HAND KNURLING TOOLS

Fuline Hose Couplings

The Pittsburgh Brass Mfg. Co., 3220 Penn Ave., Pittsburgh, Pa., has developed a new line of cast bronze hose couplings for joining similar or dissimilar sizes of rubber hose on air, water,

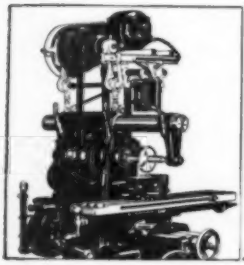


steam and gas lines operating up to 200 lbs. pressure per sq. in. They are being marketed under the trade name of "Fuline."

In addition to quick opening and closing features, Fuline hose couplings employ a positive locking device, thus assuring increased safety for workmen. When connection is made, there is no chance of lock spring escaping from sleeve and causing possible accident. This safety feature is particularly valuable when coupling is employed on air compressors and for steam connections in boiler rooms, etc.

Illustrations show male and female Fuline hose couplings ready for connecting and also connected, as well as male and female pipe ends.

Standard sizes are available for ⅜", ½", and ¾" hose. Larger sizes can be built to specifications.



Ready for WAR ORDERS?

Speed—will be the first order. Double your output by equipping your PRESENT cone pulley machine tools with Remco Motor Drives. The only drive scientifically designed for the use of any motor—new or USED—of reasonable size. Saving on belting alone very often pays for a complete Remco installation. Get details—write! Remco Products Corp., State St. at R. R., York, Pennsylvania.

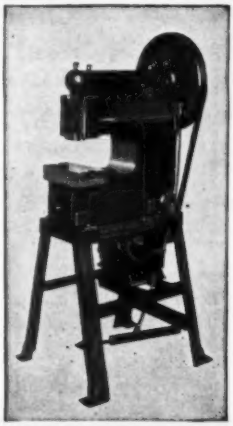
REMCO MOTOR DRIVES
for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

THE WHITNEY-JENSEN HEAVY - DUTY PUNCH No. 129

POWERFUL • ACCURATE • DURABLE

Check these features for VALUE. Capacity 10 tons. Length of stroke 1 1/4". Stroke adjustment, 1 3/4" Die space stroke down adjustment up 4". Depth of throat 12". Complete with motor. Guaranteed. Standardized construction. Punch and die service available.

Write for complete circular



WHITNEY METAL TOOL COMPANY
115 FORBES ST., ROCKFORD, ILLINOIS

A FAST TRACK FOR AIR POWER

Pneumatic tools, like most thoroughbreds, perform best under ideal conditions. Norgren Strainers prepare the track: they remove grit, scale and 92% of the moisture from the air. Norgren's Sight Feed **Automatic** Air Line Lubricator conditions the tool (lubricates it) by injecting an **accurately controlled** oil fog into the air stream. Both are scientific spurs to fine performance. Sold singly or in units.

Write for sizes, specifications and prices.

C. A. NORGREN CO., INC.
214 Santa Fe Drive **Denver, Colo.**

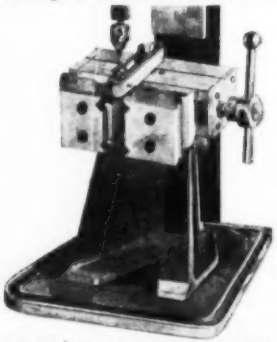
"CHAMPION"
Steel Racks

Save time, steps and money by keeping bar stock, shafting and pipe out of the way and off the floor.

Write for full details.

The Western Tool & Mfg. Co.
Springfield, Ohio

Do it Faster, Easier, Cheaper and Better with



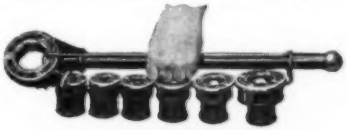
"JOHNS" DRILL JIGS

Send us your blueprints for our tooling layout suggestions—no obligation.

HEUSER MFG. CO.,
1638 N. PAULINA ST. CHICAGO

Ridge Develops New Threading Tools

Latest additions to the Ridgid line of pipe tools made by The Ridge Tool Co., Elyria, Ohio, are five new ratchet and three-way threaders for small pipe.



No. OR and 11R RIDGID Ratchet Threaders for ⅛" to 1¼" pipe.

No. 30-A and 31-A 3-way Ratchet Threaders for ⅜" to 1" pipe.

Nos. 00R, 0R and 11R are of new, stronger design in all-steel malleable alloy. They thread ⅛" to 1¼" pipe. Separate sets of semi-high-speed tool steel chaser dies are accurately cut, easily removed for regrinding. In No. 00R, die heads are quickly locked in or removed by a pull of the ratchet knob. In Nos. 0R and 11R die heads push out easily for changing, snap into ratchet ring from either side, can't fall out. Electrical conduit dies are furnished at regular die prices.

The Series Nos. 30A and 31A three-way threaders for small pipe have virtually the same features as the series described above. They are compact, have double ball - end handles and thread pipe from ⅜" to 1".

The NEDCO FILLER RUBBING MACHINE

Cuts Costs! Speeds Production!

This New Nedco Filler Rubbing Machine has the correct speed. Economical, efficient, low in price, easy to handle, A. C. or D. C., weighs 7 lbs.—Truly a remarkable tool.

Investigate TODAY—Do not delay.

The NEDCO Company
87 RUMFORD AVE., WALTHAM, MASS.

$48.50 F. O. B. Factory

MICHIGAN BOULEVARD
WHERE
CHICAGO
LIVES

● The pulse of the city—Michigan Boulevard. Chicago works and plays to the tune of its rhythmic hum. In the most convenient location on this famous thoroughfare, Hotel Auditorium provides spacious pleasant rooms, excellent service and superb cuisine, at reasonable rates.

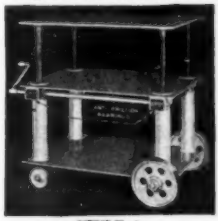
WITH BATH from $2.50
WITHOUT BATH from $1.50

GEO. H. MINK Mgr.

MICHIGAN AT CONGRESS

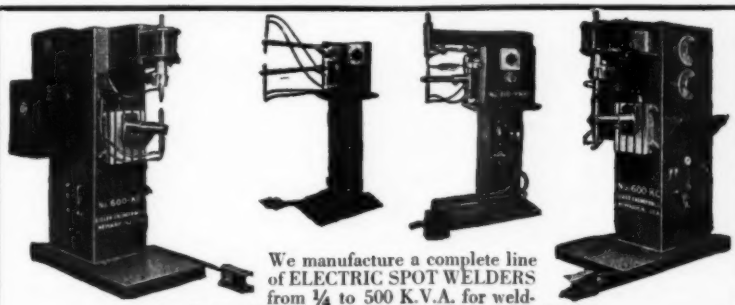
HOTEL
AUDITORIUM

"Not a Shop Accessory; a Shop Necessity"
The
HAMILTON PORTABLE ELEVATING TABLE
"PORTELVATOR"
Reg. U. S. Patent Office



STYLE A

Contributing to Lower Production Costs in the Tool Room, Machine Shop and Punch Press Room
HAND AND POWER OPERATED—
One to 20 Ton
Write for full details.
The Hamilton Tool Co.
B and Wayne Sts. Hamilton Ohio



We manufacture a complete line of ELECTRIC SPOT WELDERS from ¼ to 500 K.V.A. for welding Brass, Aluminum, Bronze, Stainless Steel, Galvanized Sheets, Monel, Molybdenum, Tantalum, Nichrone, Tin Plate, Copper, Nickel, Silver, Gold, Etc. We can supply a Welder for any need.

Butt Welders to weld from .010" to ½" dia. metal.
We invite contract Spot Welding in large or small quantities.
We also make standard and Special TRANSFORMERS of all kinds.
A. C. ARC WELDERS from 100 to 400 Amps.

For any further information write direct to—
CHAS. EISLER
EISLER ENGINEERING COMPANY
762 So. 13th St., (near Avon Ave.) Newark, New Jersey

TROYKE ROTARY TABLES

Moderately Priced

Made in 9", 12", 15", 18", 21", 25".
With or without dividing plates.
Ask your dealer or write us for complete catalog.

ALFRED A. TROYKE
4422 Appleton St., Oakley, Cinc., Ohio

SAVE 25% IN DRESSER COST!

CARBOLOY

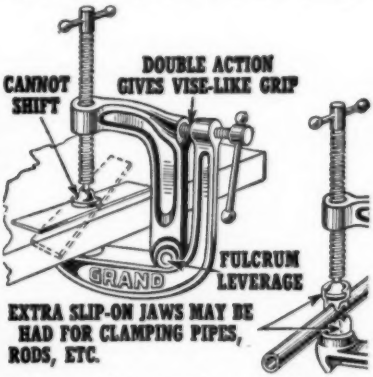
DIAMOND DRESSERS

For Dressing All Grinding Wheels

Write for Catalog DR-38
CARBOLOY COMPANY, INC.
11139 E. 8 Mile Road, Detroit, Mich.
Chic.-Cleve.-Newark-Phila.-Pitts.-Worcester, Mass.

The "Grand" Vise-Clamp

A new idea in clamps has been developed which seems to solve the old problem of creeping and shifting. It is a product of the Grand Specialties Co., 3107 W. Grand Ave., Chicago and incorporates the standard clamp principle with an additional vise feature.


CANNOT SHIFT
DOUBLE ACTION GIVES VISE-LIKE GRIP
GRAND
FULCRUM LEVERAGE
EXTRA SLIP-ON JAWS MAY BE HAD FOR CLAMPING PIPES, RODS, ETC.

This is said to provide a positive grip that eliminates surface movement of the clamp or material under pressure. The clamp screw turns in a hinged bracket—the hinge acting as a fulcrum with the base of the clamp which has a vise screw working against it. This brings the main clamp screw directly down on the work.

Extra slip-on jaws are available for clamping pipes, rods and tubing. Three sizes are offered with openings 3", 4" and 6".

OPEN THE WAY TO GREATER PROFITS

BY USING S&S HINGES

BUTTS AND CONTINUOUS LENGTHS — *for* GUARDS — CABINETS — CASES — BOXES — LUGGAGE
WRITE FOR CIRCULAR
S & S MACHINE WORKS
HARDWARE DIVISION
4839 WEST LAKE STREET CHICAGO, ILLINOIS

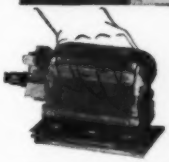
STILL sanding by HAND?

DO IT MECHANICALLY 3 TIMES FASTER!

The Sterling Speed-Bloc Sander:

Cuts sanding time 50% to 75%.
Reduces costs 50% to 75%.
Does better, more uniform sanding.
Sands, polishes curved or flat surfaces.
Works on wood, metal or any surface.
Does wet or dry sanding.
Easily operated by any employee.

Ask For Free Demonstration



Sterling SPEED-BLOC SANDER

STERLING PRODUCTS COMPANY
3380 Robertson Blvd., Los Angeles
2459 Woodward Ave., Detroit

THE LATEST TOTALLY ENCLOSED DUST-COLLECTING FINISHER

ARMGLO "SPEEDSTER" ABRASIVE BAND FINISHER

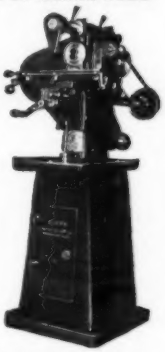
makes sanding . . . surfacing . . . polishing and burring of castings . . . dies . . . stampings . . . die castings . . . moulded products and machine parts an easy and quick operation. It eliminates slow, costly hand labor. In addition to fast production you get finished work that is flawless. Pays for itself many times over in time and labor saved. *Send TODAY for descriptive bulletin.*

ARMGLO COMPANY
3520 W. PIERCE ST. MILWAUKEE, WISCONSIN

In the Atlas Press Co., exhibit in the Hall of Inventions at the New York Fair, Marguerite, Francis and Katherine Kirchner, attractive triplets from the Borden Exhibit offer a feminine interpretation of machine shop stance.

Clean,
SHARPLY DEFINED
Scribed Lines
SECURED QUICKLY, EASILY
AND ECONOMICALLY WITH
Micro Supreme
LAY-OUT DYE
TRIAL OFFER: A handy five-ounce Combination Brush-In-Can...ideal for shop use and for trial purposes....for only . . . . . 60¢
MICHIGAN CHROME CO.
6348 E. JEFFERSON AVE., DETROIT, MICH.

BURKE
MILLING MACHINES
Make Fast Work of Small Jobs
Motor Driven
Timken roller or ball bearings to spindle
Write today for circulars.

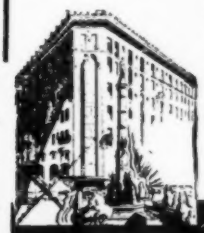


Burke Machine Tool Co.
297 E. 16th St., Conneaut, Ohio

What Do You Demand In a Good Hotel?

Do you like well-appointed, homelike rooms, comfortable beds, good food at reasonable prices, a safe place for your car?

Must **your** hotel be conveniently located to business, stores, theatres?



If those are the things you demand in a good hotel, you'll like Hotel Lafayette.

Rates

Single.....$2.50 up
Double..... 4.00 up
Special rates for 4 or more.

Write for Folder J.

Hotel LAFAYETTE
BUFFALO, N.Y.
H. A. KELLY, MANAGER

DRILL CHUCKS

HARDENED STEEL JAWS

Write for catalog

WHY PAY MORE?

Capacity 0 to ½" fitted with No. 1 or No. 2 Morse taper shank ..... $1.25 ea.

No. 1 or No. 2 Morse taper shanks with ½"x24 thread 73¢ ea.

Chucks without shanks.....52¢ ea.

NIELSEN, INC.
LAWTON, MICHIGAN

MARSCHKE
Heavy Duty Grinders and Buffers

You know what a man means when he describes a job as "A DIRTY DAILY GRIND," but have you stopped to think that the term probably developed from observing ordinary services of Floor Stands, Swing Frame Grinders, Buffers and similar machinery?

You need a good machine for that kind of work. It must have "heft" but it also must have refinements of design for convenience and safety of operation and exacting execution of that design to exclude the dirt from motors and bearings.

That is one of the reasons for standardizing on MARSCHKE GRINDERS and BUFFERS.

A Catalog with seventy different Grinder and Buffer specifications will be sent promptly upon receipt of your request.

VONNEGUT MOULDER CORP.
1805 Madison Avenue -:- Indianapolis, Ind.

Johnson Adds Feeder Trucks

The O. Johnson Mfg. Co., Dept. O, 6027 W. Roosevelt Rd., Cicero, Ill., has added two new lines of flat top die trucks (called feeder trucks) to their line of Multi-duty die trucks and portable work benches. These are of sturdy, rigid, electric - welded construction and are made for long and useful service.

The simplicity and ease of operation make them handy in tool, die, and machine shops, particularly for transferring, transporting, supporting, etc. They are also very useful around punch presses.

Style No. F-1 has a 28" x 40" table. Maximum height from floor is 40" and minimum height is 24". Safe load is 3,000 lbs. and shipping weight is 400 lbs.

Style No. F-2 has a 24" x 32" table. Maximum height from floor is 40" and minimum height is 24". Safe load is 2,000 lbs.

Ball bearing heavy duty casters, rubber cushioned are used on both models. Shipping weight is 325 lbs.

—GEARS—

Spur—Helical—Worm—Bevel—Miter, Etc.

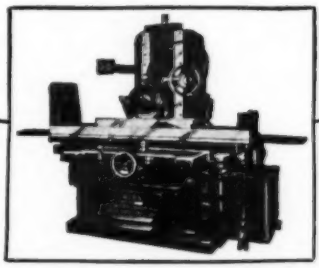
We do broaching and all kinds of grinding.

We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

TAYLOR MACHINE CO.

1919 E. 61st St., Cleveland, Ohio



New No. 55 Grand Rapids Hydraulic Feed Surface Grinder

This and many other sizes described in new Bulletin GL100. Now is the time to invest in equipment which will enable your men to earn more.

GALLMEYER & LIVINGSTON CO.

405 Straight Ave., S. W.

GRAND RAPIDS, MICHIGAN

Turret Lathe Data

Efforts being made to alleviate the present serious industrial "bottleneck," the lack of trained machine tool operators, attract attention to the Gisholt Performance Data Sheets. These data sheets, which Gisholt has been issuing for the past several years, are finding wide acceptance among production executives for use in instructing new men.

During the past year, these sheets have been issued in loose-leaf form, for ready reference. They are based upon actual case studies of improved machining methods employed by many different users of Gisholt Turret and Automatic Lathes. Each sheet is an analysis summary of the machining of a part and is prepared in a manner that makes the data valuable to new operators as well as skilled machinists, foremen, superintendents, engineers, and other production executives. Diagrams and photographs clearly illustrate the actual tooling on each job. Operation sequence, feeds, cutting speeds, tolerances and machining times are also given. This information can be used as a valuable basis of comparison by anyone turning out similar parts or employing similar machining methods.

The current series of Gisholt Performance Data Sheets, Numbers 50 to 53 inclusive, is based on studies made in plants manufacturing tools, pulverizing equipment, hoists and automotive trucks. Copies of these sheets are available from Gisholt Machine Co., 1257 East Washington Ave., Madison, Wis.

"ALNOR" PYROMETERS

for every requirement.

Inexpensive, accurate, durable.

Write for catalog.

Illinois Testing Laboratories, Inc.
150 W. Austin Ave., Chicago

JOHNSON No. 70 Furnace Gives 2500° F.
for Hi-Speed Heat-Treating
at Low Cost $79.50

Save time and money with this new low-cost all-purpose furnace, suitable for forging, heat-treating Hi-Speed Steels, carbon and intermediate steels, tempering and hardening punches, dies and tools. CARBORUNDUM HEARTH is standard equipment. Firebox (9"x 7¾"x5") is heavily lined with 2½" insulating refractory. General Electric Motors furnished with Johnson Blowers. Available in either bench or pedestal style.

No. 120-Firebox 13½"x7¾"x5"

Send for Johnson Gas Appliance Catalog and Price Lists.

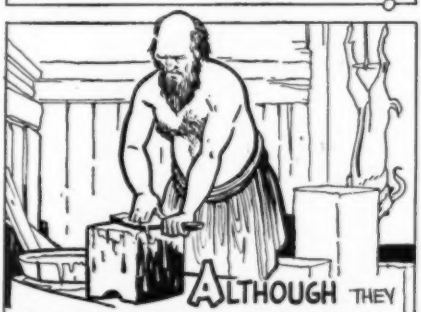
We welcome your problems relative to gas application in heat treating, or any gas burner equipment.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA
524 E. Ave. N. W. ESTABLISHED 1901

Mechanics Through the Ages

UNTIL COMPARATIVELY RECENT TIMES THE ENGLISH VILLAGE BLACKSMITH WAS THE OFFICIAL COMMUNITY **DENTIST** AS WELL! THIS CUSTOM ORIGINATING IN THE MIDDLE AGES WAS STILL IN VOGUE IN REMOTE RURAL HAMLETS UNTIL THE 1890's!

ALTHOUGH IT HAD SUPPORTED A 150-POUND WEATHER-VANE FOR 115 YEARS, THE BRONZE BALL BEARING REMOVED FROM THE STEEPLE OF THE "OLD TRINITY" CHURCH, LANCASTER, PENNSYLVANIA IN 1910, WAS FOUND TO BE ONLY SLIGHTLY WORN! THIS BEARING, 5½ INCHES IN DIAMETER, HAD BEEN INSTALLED IN 1794 AND HAD NEVER BEEN LUBRICATED.



ALTHOUGH THEY HAD FILES, THE ARTISANS OF ANCIENT ROME PREFERRED TO SMOOTH PIECES OF FORGED METAL BY RUBBING THEM WITH A MIXTURE OF HE-GOAT'S BLOOD AND SAMIAN EARTH!

New Gear and Shafting Alloy

S.A.E. 4815, a carburizing nickel-molybdenum steel, carried in stock by Joseph T. Ryerson & Son, Inc., Chicago, has recently come into prominence for heavy duty gear and shafting applications. In the normalized condition, its machining properties compare with S. A. E. 4615 and S. A. E. 2315 in respect to cutting speeds and finish. Carburizing practice is much the same as for S. A. E. 2315. Although some shops are quenching direct, the single quench from above the core critical after slow cooling from the carburizing temperature is preferred. In distortion it compares with S. A. E. 2315 or S. A. E. 4615.

An outstanding advantage emphasized for S. A. E. 4815 is the high core strength which may be developed by single quench treatment. In sections up to 1", tensile values up to 200,000 p.s.i. and yield strengths in the neighborhood of 165,000 p.s.i. may be developed in the core, together with hardnesses up to 415 B. H. N., providing excellent backing for the case under crushing loads. The tough, fine-grained case which is readily developed, provides excellent resistance to wear, spalling and pitting fatigue.

This steel is recommended for heavy duty parts such as gears, pinions, spindles, splined transmission shafts, pins and miscellaneous stressed parts of trucks, airplane motors, tractors, pneumatic and machine tools, oil field power transmission and drilling equipment and other similar applications.

The new alloy is carried in stock by Ryerson in hot rolled rounds (not annealed in diameters ranging from ½" to 6" inclusive.

For Machine and Tool Work & Quick Set-Ups

The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading. New improvements.

Price $5.00 *Write for folder.*

J. R. Reich Manufacturing Co.
334 Triangle Ave., Dayton, Ohio

STOP SHOUTING over Shop Phones

No matter how noisy the shop location, you don't have to shout when you telephone. Just install a Burgess Acousti-Booth and talk easily within this quiet booth.

This Booth Creates a "Zone of Quiet"

This amazing new doorless phone booth has a patented acoustic lining that blots up factory noise. Always airy and easy to keep clean. No doors—no hinges—no fans—no maintenance. Used in hundreds of plants.

This Acousti-Booth Soaks Up Noise
Mail Coupon for Free Booklet

Burgess Battery Company, Acoustic Division
Dept. HM, 500 W. Huron St., Chicago
Please send Free booklet describing Burgess Doorless Acousti-Booth and how it makes telephoning easy in noisy places.

Name.....
Firm Name.....
Street-City.....

BURGESS ACOUSTI-BOOTH
Operating under Burgess Patents

ATTENTION INDUSTRIAL PLANTS

INVESTIGATE our complete power transmission service. There Are NO EXTRAS Such As Additional Brackets, Belts And Pulleys To buy, with Cullman Drive Equipment. All necessary parts are included in one low price except electrical equipment.

May we have an opportunity of estimating on your requirements.

VARIABLE SPEED PUNCH PRESS DRIVE
Complete less electrical equipment
$116.00
F.O.B. Chicago, Ill.

New York Tribune Bldg.

CULLMAN SALES CO.

Detroit 1702 Kales Bldg.

Authorized distributors for Cullman Machine Tool Drives with Variable Speed Arrangement.

Carroll Develops New Clutch

A new type "CEE" disc clutch is offered by L. W. Carroll Mfg. Co., 2046 Ross Ave., Cincinnati, Ohio.

Intended for mounting of pulleys, sprockets, gears, etc. the sleeve member has bronze bushings as standard equipment, for long life and easy renewal.

The makers claim that it affords instant release with drag-free idling and that centrifugal force cannot engage the clutch. Operation is easy due to rollers and the high lever ratio. Cam and rollers are of hardened steel. Three sets of levers provide even pressure on the friction discs. A single disc Type "CE" clutch of the same general design is also available.

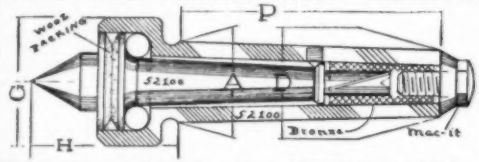
A Chance to Help Boys Town

We've just received a personal appeal from Father Flanagan's Boys Home, Boys Town, Nebraska.

So many of the youngsters there have expressed a desire to learn mechanical trades that Father Flanagan, founder and director is planning to establish a school of mechanical arts and machine practice. The institution is a non-sectarian non-proselyting home for derelict boys regardless of race, creed or color.

Several machines have already been donated through the generosity of manufacturers, but a few more are needed to complete the shop equipment. Time is short until the Fall school term be-

RIGID RESILIENT BULL CENTER



Rigid Tool Holder Co., 2,000 Witherell St., Detroit, Michigan

A disappointed buyer is slow in paying for his disappointment; while we have never yet, lost a dollar, on a purchase order; or a customer that we know of; and seldom send out a "Please remit". But we are real cranky, about good work, and good material. The best is none too good. Excellence in Designing and Manufacturing is Excellence in Advertising.

All Morse tapers carried in stock.

For exceptional convenience, courteous service and reasonable rates, choose the Hotel Philadelphian. Enjoy its cheerful, airy rooms; air-conditioned restaurants and lounge . . . and its location away from street noises within a five minutes' ride to the heart of the business district. Special attention to convention groups and banquet parties.

600 ROOMS $2.75 up

HOTEL

PHILADELPHIAN

DANIEL CRAWFORD, JR., Manager

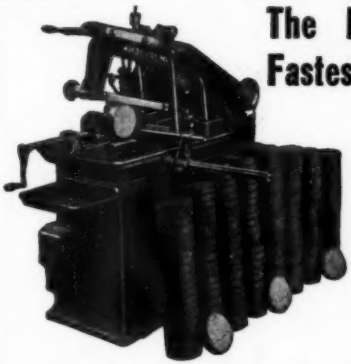
RECLINABLE POWER PRESSES

We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

Write for bulletins.

ZEH & HAHNEMANN CO.

Newark, New Jersey



RACINE Shear Cut—6x6 and 8x9 Capacity. With one blade 176 cuts, 5" Rd. Alloy Steel, each cut exactly 3½ min., and the blade still good.

The RACINE Shear Cut— Fastest Cutting Production Saw

This metal cutting saw, built on the exclusive positive, progressive screw feed principle, feeds the blade uniformly and progressively throughout the cutting stroke, allowing each tooth to take a long curling chip. This smooth shearing action saves blades and cuts faster.

This Shear Cut Model is one of a very complete line, including RACINE Heavy Duty Hydraulic Machines, RACINE Medium Duty Hydraulics and RACINE Utility Saws—6"x6"—to 14x20" Capacities.

RACINE TOOL & MACHINE CO.

1754 State Street -:- Racine, Wis.

gins, so it is impossible to contact manufacturers and suppliers of these machines directly. Further, the building program recently completed at Boys Town, makes it financially impossible for Father Flanagan to purchase this needed equipment.

The machines needed include:—a No. 2 universal milling machine with dividing head and change gears; a surface grinder (18"x6"—or larger or smaller); a 14" or 16" crank shaper, back geared with vise; a No. 2 and a No. 4 open back reclinable punch press. These machines need not be new. They can be old ones taken in trade and rebuilt.

Flexrock Develops New Active Ingredient

Flexrock's Chief Chemist has developed a new active ingredient which, used in Flextite, brings its activity down to a measure of seconds instead of minutes as in the case of other leak stopping materials. The new Flextite is used with ordinary portland cement and forced against water pressure, held there only a few seconds and the leak is stopped.

The material is naturally valuable for stopping leaks in dams, retaining

All About Arc Welding
THE NEW HANDBOOK
Your Guide to Progress

★ Here are the results of twenty years' fact-finding on the part of a staff of two hundred arc welding experts contacting every industry throughout the world. The new 6th edition "Procedure Handbook of Arc Welding Design and Practice" contains up-to-date facts about all aspects of arc welding and its many profitable applications, compiled and edited for quick reference and easy understanding. This authoritative reference guide will enable you to keep abreast of this fast-growing industry for personal advancement and profit. You cannot afford to be without this valuable new Handbook.

★ ★ ★

Complete in every detail. In eight parts—(1) Welding Methods and Equipment. (2) Technique of Welding. (3) Procedures, Speeds and Costs. (4) Weld Metal and Methods of Testing. (5) Weldability of Metals. (6) Machine Design. (7) Structural Design. (8) Actual Applications.

Recognized throughout the world as the authentic reference book on arc welding. More than 90,000 copies of first five editions have been sold. 6th edition is an entirely NEW Handbook, containing important new information. Written clearly. Well indexed for quick reference. Size 6" x 9" x 1¾"—ideal for use in office, shop or school. Printed on fine paper. Bound in semi-flexible simulated leather—gold embossed.

Order your copy today. Mail your order and check to

THE HITCHCOCK PUBLISHING CO.
508 So. Dearborn St., Chicago, Ill.

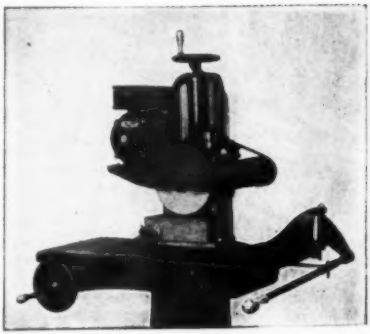
walls, dykes, concrete holding water at irrigation plants, reservoirs, concrete tanks and other such places. It is also recommended for waterproofing and damp-proofing generally in cellars or basements, in pits, tanks, and other such places. Detailed instructions explaining the simplicity of handling this new, more active material may be obtained promptly by addressing Flexrock Co., 2305 Manning St., Philadelphia, Pa.

Grob Offers New Saw

Grob Brothers, Grafton, Wis., are now building a new Model NS-18 (18" throat) band saw. It is built for the tool room as well as for the general machine shop.

The machine consists of a one piece welded steel frame, reinforced for rigidity. Swinging doors provide quick access to change saw blades. A cast iron table of box section construction and heavily ribbed, 24" x 24" in size, is tiltable four ways. Besides being clamped in the conventional manner, it is locked with a table stabilizer.

A butt welder with built - in tool grinder is mounted into the frame in a



Now---a surface grinder just for your small tool and die work---

The Builders "T" Surface Grinder—the product of a Company with over 40 years' experience in the manufacture of grinding machines embodies the best conventional features, as well as new elements of design which offer greater convenience and accuracy.

SMALL WORK CAN BE DONE CHEAPER

on this machine than on large automatics which not only require greater set-up time but, due to overtravel and less flexibility, longer grinding time, too.

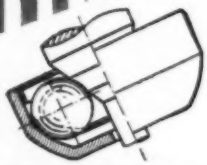
MACHINES ARE MODERATELY PRICED

so that it pays to install them at points convenient to the men who frequently have small grinding to do.

For Bulletin V644, address—

BUILDERS . PROVIDENCE
IRON FOUNDRY RHODE ISLAND

RMB



This is Type P. 1.S Enlarged 20 diameters.

MINIATURE BALL BEARINGS

A complete line of small Ball Bearings. Types for Radial, Axial or Angular Loads. Easily mounted — Widely adaptable.

Write for catalog No. H-2.

LANDIS & GYR, Inc.
104 5th Ave. New York

convenient position for joining saw blades for internal cutting.

Upper and lower saw guides are adjustable in height. The lower saw guide can be brought flush with the table surface or above the table surface for special jobs. For cutting sheet metal it is adjusted to be just slightly above the table surface which eliminates chattering and possible breakage of saw teeth. Both upper and lower saw guide holders are locked into position by an improved, single lever quick acting clamp.

A one h.p. motor is used in connection with a silent, "V" belt drive. All pulleys are mounted on ball bearings. Ten speeds are provided, from 50 to over 2000 feet per minute to the saw blade.

A chart for the selection of saw blades as to width, number of teeth and speeds is mounted into the machine. Thus, the operator knowing the smallest curves to be cut, the thickness and kind of the material, will immediately know what saw blades to use. Saw band tension wheel and indicator are on upper right of the machine.

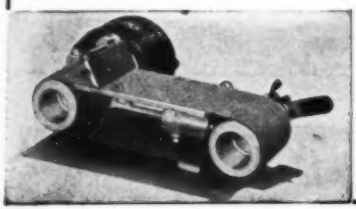
Welder Incorporates Burr Grinder

The Eisler Engineering Co., 762 So. 13th St., Newark, N. J., have developed a new portable butt welder with a burr grinder and annealer, mounted on a portable fabricated case.

One of its many applications is in the repair of stranded wire, where the faulty sections are burned out electrically and the strands fused, preventing the ends from unraveling. The final steps are to butt weld the two ends, and grind off any burrs that may have appeared. The grinder has an accurate adjustment to compensate for wear in the abrasive and there are two special bushings to guide the stranded wire to the grinder which squares off the ends to make neater butt welds.

All wiring has been concealed within the fabricated case, and a draft tube has been provided to remove grinding

AN INEXPENSIVE **ABRASIVE BAND GRINDER**



"Built Like A Machine Tool"

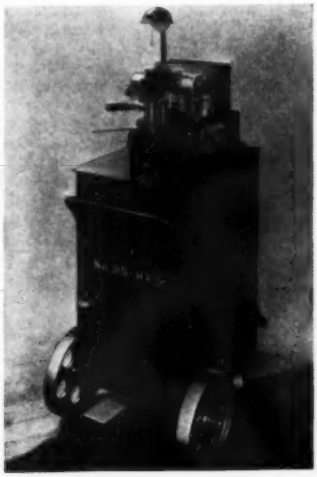
The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite lubrication, complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

WALLS SALES CORP.
96 Warren St., New York, N. Y.

dust from the vicinity of the work.

The welder is supplied with a 3 KVA air-cooled transformer and 8 point variable switch for current regulation. It is foot operated and the butt jaws can be water-cooled for continuous service.



Metals from 1/16" to 3/16" diameter can be welded. For butt welding other sizes of wire or metals, the units are available with transformers from 1 KVA up to 7½ KVA capacity. Production is increased because the grinder and annealer are incorporated in the one compact unit.

Oil Dispensing Hand Pump

The clean and efficient handling of cutting oils, lubricating oils, alcohol, kerosene and cleaning liquids is facilitated by a handy dispensing pump developed by the Grandahl Tool & Machine Co., 1200 Park St., Hartford, Conn.

Sturdy and compact, the pump is readily attached to drums or containers and has a capacity of six strokes per gallon. The vertical suction pipe, on which the pump is mounted, extends down into the container. Delivery pipe, extending from upper part of pump barrel, is a long goose neck.

PRODUCTION TOOLS

Chrome Plated

Gage Blocks

¶ Better craftsmen, working under modern methods realize the value of CHROME PLATED GAGE BLOCKS as a production instrument.

¶ Assured accuracy on the production line means a speedy assembly.

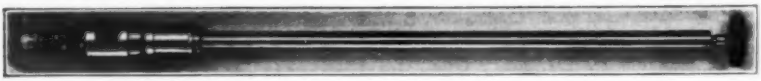
¶ Use Chrome Plated Gage Blocks in all operations to solve the problems of accuracy.

DEARBORN GAGE COMPANY

"Originators of Chromium Plated Gage Blocks"

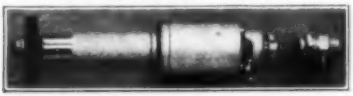
22035 Beech Street

DEARBORN - MICHIGAN



Rotor Offers Two New Die Grinders

The Rotor Tool Co., Cleveland, Ohio announces two new air die grinders, of the production type, the M-825 and the M-826, for use with wheels from ½" to 2-½" diameter.



The M-826 is designed for getting into otherwise inaccessible places and the side to center distance is only 19/32". The speed is 17,000 or 21,000 r.p.m.; weight 2-⅜ lbs.

The M-825 features an extension of either 13" or 26" for cleaning up the inside of shells. The side to center clearance of this machine is reduced to ½". Weight is 7 lbs.

Various types of handles, such as sleeve twist, spade, button safety or right angle throttle, are used interchangeably on both machines. The manufacturer claims that the motors of both machines provide ample power for holding high load speed for fast cutting and long wheel life.

Syntron Car Vibrators

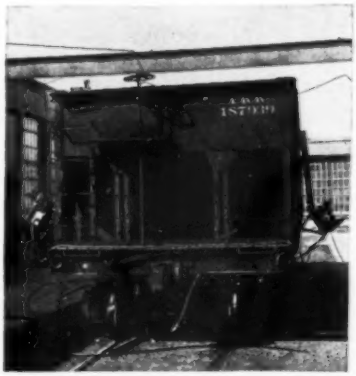
A new large vibrator, fitted with hooks as shown, has been developed by the Syntron Company, 300 N. Lexington Ave., Homer City, Pa. It is intended for attachment to hopper bottomed railroad cars to speed up the emptying process.

The vibrators are huge pulsating electro-magnets striking 3600 times per minute, and together with the hook, weigh 950 lbs. each. They are used in pairs, two to a car, on opposite sides. Provision must be made for handling by means of an overhead crane or hoist.

The makers say that initial installations have shown that two men working with two vibrators can unload a car of fine coal in less time than six or eight men can sledging and poking.

The vibrators are also designed to be used without the car hook, on big bunkers and storage bins to promote a free flowing discharge of the material.

Each vibrator is provided with a separate electrical control panel containing a thermionic valve for converting a.c. into pulsating current, operating switches and a variable resistance for controlling the vibrator's amplitude or power. The equipment is designed for operation on 220 volts, single phase current.



Smaller vibrators are available for material handling purposes. A common application is on steel chip bins to keep the material flowing freely after it has been held a while and permitted to rust. They are also used on chutes and hoppers, in vibratory packers and for vibrating molds, forms, screens, etc.

Interstate's New General Offices

Interstate Machinery Co., Inc., Chicago, will move their general offices, on or about Aug. 1, to their large warehouse at 1431 West Pershing Road. The new phone number will be "Yards 5800." The downtown branch at 109 So. Clinton St., will be continued

Lock Nut Attaching Machine

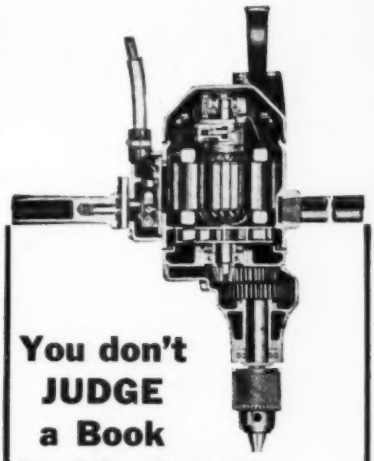
A special streamlined machine has been designed by Fabri-Steel Products, Inc., Detroit, for the setting of Fast-on lock nuts (a clinch nut of their manufacture) where large scale production is required.

The nuts are fed from a continuous rotating hopper (capacity 1000 - ¼" nuts) to an anvil, where the clutch is tripped and the nut locked in place. The machine has a speed of 200 r. p. m. — there are no obstructions to interfere with the operator and on the assembly of small parts, it is reported, that 2500 lock nuts can be set per hour.

Factors quoted, which make practical such a high rate of production with a minimum of spoilage and a maximum of safety are:—1. Non-repeating clutch, crank is locked in dead center position and only then can machine be tripped. 2. As fast as nut is locked into place — another nut is fed into position ready to be installed. 3. A narrow anvil and a square - cornered nut, which makes locating easy. 4. Length from floor to work may be adjusted from 34" to 39" which assures the operator a comfortable and natural position. 5. Safety anvil eliminates overloading the machine or stalling the motor.

The base has a three point suspension and occupies a space 27" wide by 30" deep.

Where production comparable to the automotive industry is not a necessity, complete independently driven hoppers and chutes for attaching to punch presses for single or multiple feeding are available for all sizes.



You don't JUDGE a Book by it's Cover!

Nor will the outward appearance of an electric drill tell what you need to know. We invite you to take a Hisey drill apart, and its surprisingly simple (due to the Hisey Unit type construction). All you need is a screw driver. Better still, compare the parts with other drills you may be using. Then you can appreciate why Hisey drills give long and continued service with minimum repair bills, yet cost no more than you are now paying for corresponding types.

Hisey drills are made in a number of models in sizes from ¼ to 1¾ inch capacity in standard and heavy duty types.

Ask for Catalog 50 HD

THE HISEY-WOLF MACHINE CO.
Cincinnati, Ohio

Hisey

New Trade Literature

—1—PAPER AND PLUG GAGES

Two new bulletins by Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn., cover the Electrolimit paper gage and the Pilot cylindrical plug gage. In connection with the latter, Pratt & Whitney is the direct licensee in this country from the British originators.

—2—QUICK BATTERY CHARGERS

Battery charging, particularly for airplanes is the subject of a new bulletin issued by Hobart Brothers, Troy, Ohio. The unit comprises a compact generator with switch and distribution panels with handy connection leads for the efficient handling of 24-volt aircraft batteries.

—3—FLEXIBLE SHAFT EQUIPMENT

A new 40-page catalog by R. G. Haskins Co., 623 So. California Ave., Chicago covers their complete line of flexible shaft equipment.

—4—SIGHT GRAVITY AND WICK FEED OILERS

Bulletin No. 10 covers the new line of oilers developed by Gits Bros., Mfg. Co., 1860 So. Kilbourn Ave., Chicago. A supplementary bulletin presents the new unbreakable oilers.

—5—COLD FINISHED BARS

Because of the diversified uses for the product, a new bulletin by Joseph T. Ryerson & Son, Inc., Chicago, should be of interest. It gives a complete description of the wide range of cold finished steel bars carried in the extensive Ryerson stock, with chemical analysis, working properties, suggested applications and other useful data.

—6—BENDING PRESSES

An attractive new catalog No. 2002-20 is in reality, a bending press manual. Issued by Cleveland Crane & Engineering Co., Wickliffe, Ohio, for whom Cyril Bath & Co., Cleveland are general sales agents, it presents the Steelweld line. A center double spread offers drawings of more than a hundred typical bends. 28 additional drawings show bending dies for many purposes.

—7—VARIABLE SPEED PULLEYS

A technical description, dimensional information and application data are given in a new bulletin D3001 issued by The Speedmaster Co., Des Plaines, Ill. Information is given on belt installation, speed adjustment, motor mounting, efficiency and power capacities.

—8—MULTI-PURPOSE MACHINES

Combining the functions of a precision lathe, a sensitive drill press, horizontal and vertical milling machine, the No. 10 tool room machine should have wide application. Bulletin No. 51 by Hannifin Mfg. Co., 621 So. Kolmar Ave., Chicago tells the whole story.

—9—PRODUCTION DRILL PRESSES

Interesting features of the line of drilling machines made by Production Machine Co., Greenfield, Mass., are presented in a handsome new 8-page bulletin.

—10—CONVERTERS AND SPEED REDUCERS

Rotary converters and speed reducers made by Janette Mfg. Co., 556 W. Monroe St., Chicago, are listed in bulletins 13-1 and 28-8 respectively. Accompanying data sheets give ratings and performance data.

—11—PORTABLE TOOLS

Bulletin No. 19 by Mall Tool Co., 7742 So. Chicago Ave., Chicago presents the full line of portable tools for industry, including flexible shaft devices, sanders, drills, etc.

—12—PANTOGRAPHS—ACCESSORIES

A new 50-page manual (1385-B) by George Gorton Machine Co., 1115 13th St., Racine, Wis., gives complete instructions for the care and operation of pantagraph machines. Catalog 1580 illustrates and describes the machines themselves and a new catalog 1317-B introduces the extensive line of accessories.

—13—POWER MACHINERY—TENSION INDICATORS

Th Duro line of power machinery is adequately presented in catalog E-40-B, issued by Duro Metal Products Co., 2655 N. Kildare Ave., Chicago. A new four-page bulletin also gives full information on the Duro-Chrome tension indicator wrenches.

—14—TOOL ROOM MILLING MACHINE

Detail features of the new Hardinge precision tool room milling machine BB-5 are set forth in an attractive four-page bulletin.

—15—THERMOCOUPLES

The problem of selecting the correct thermocouple and protecting tube is simplified by a new 40-page catalog (N-33A-6) issued by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa. Tabulated in easy-to-use form, a lot of interesting and valuable information is given.

—16—DRILL PRESSES

A new 8-page folder by Boice-Crane Co., 7729 Norwood Ave., Toledo, O., introduces the many models of helmet head and series 1600 drill presses. A new 40-page catalog presents the line of saws, speed lathes, scroll saws, belt sanders, oscillating sanders, shapers and planers.

—17—GRINDERS IN AIRPLANE INDUSTRY

A unusually attractive 40-page catalog issued by Landis Tool Co., Waynesboro, Pa., covers grinding equipment for the aviation industry. Replete with illustrations and drawings, it presents a great many typical jobs.

—18—MAINTENANCE TOOLS

Catalog 31 presents 160 pages of tools and equipment for automotive and industrial maintenance, made by Owatonna Tool Co., 355 Cedar St., Owatonna, Minn.

—19—PUNCHING, BENDING CUTTING TOOLS

Catalog No. 7 embraces the entire line of punching and cutting machines, benders, punches, dies, shear blades and special tools offered by T. H. Lewthwaite Machine Co., 311 East 47th St., New York City.

LATEST EQUIPMENT CATALOGS

Check the Items in Which You Are Interested and Mail to

Hitchcock Publishing Co., 508 South Dearborn, Chicago

Please limit your choice to the ten items in which you are most interested.

- ☐ Abrasive, cloth, paper
- ☐ Adapters, adjustable
- ☐ Arbors & Mandrels
- ☐ Balancing Ways
- ☐ Baling Presses
- ☐ Band Saw Machines
- ☐ Bar Cutters
- ☐ Bars, boring
- ☐ Bearings, Ball
- ☐ Bearings, oilless
- ☐ Bearings, roller
- ☐ Bearings, tapered roller
- ☐ Bearings, thrust
- ☐ Belt Fasteners, metal, leather
- ☐ Belt Lacing
- ☐ Belt Sanders
- ☐ Belts, V Type
- ☐ Bending Machines, hand
- ☐ Bending Machines, power
- ☐ Bending Machines, angle iron
- ☐ Bending Machines, hydro
- ☐ Bending Machines, pipe
- ☐ Bending Rolls
- ☐ Blocks, chain
- ☐ Blowers
- ☐ Blueprint Machy.
- ☐ Bolt & Nut Machy.
- ☐ Boring Heads
- ☐ Boring, drill. Machy.
- ☐ Boring & Turn. Mills
- ☐ Boring Machines, jig
- ☐ Boring Tools
- ☐ Brakes, hand, power
- ☐ Brazers, electric
- ☐ Broaching Machine Tools
- ☐ Buffers
- ☐ Bulldozers
- ☐ Burnishing Machy.
- ☐ Bushings, brass
- ☐ Bushings, bronze
- ☐ Bushings, hardened
- ☐ Bushings, jig
- ☐ Bushings, steel
- ☐ Cabinets, filing
- ☐ Cabinets, tool
- ☐ Case Hardening Furnaces
- ☐ Castings
- ☐ Cement, disc grinding wheel
- ☐ Centering Machines
- ☐ Centers, lathe
- ☐ Chains, silent, roller
- ☐ Chain Drives
- ☐ Chamfering Machy, auto.
- ☐ Chucks
- ☐ Chucks, air
- ☐ Chucks, auto.
- ☐ Chucks, collet
- ☐ Chucks, combination
- ☐ Chucks, drill & tap
- ☐ Chucks, geared scroll
- ☐ Chucks, lathe
- ☐ Chucks, magnetic
- ☐ Clamping devices, air operated
- ☐ Clutches
- ☐ Coil Winding Equip.
- ☐ Collets, feed fingers
- ☐ Comparators
- ☐ Compressors, air
- ☐ Controllers
- ☐ Conveyors
- ☐ Counterbores
- ☐ Countershafts
- ☐ Counting devices
- ☐ Couplings, shaft
- ☐ Cranes, traveling
- ☐ Cranes, locomotive
- ☐ Cranes, portable
- ☐ Cut-off machines
- ☐ Cutter grinders
- ☐ Cutters
- ☐ Cutting Compounds
- ☐ Cylinders, air
- ☐ Demagnetizers
- ☐ Diamonds
- ☐ Diamond Tools
- ☐ Die casting machines
- ☐ Die Sets
- ☐ Die Sinking Machines
- ☐ Die Stocks
- ☐ Die Cushion
- ☐ Die Duplicating Machines
- ☐ Die Filers
- ☐ Dies, blank, forming
- ☐ Dies, hole punching
- ☐ Dies, thread rolling
- ☐ Dies
- ☐ Dividing Heads
- ☐ Dowel pins, steel
- ☐ Drafting Machines
- ☐ Drawing Instruments
- ☐ Dressers
- ☐ Drill Presses
- ☐ Drill Bushings
- ☐ Drills, electric
- ☐ Drill grinders
- ☐ Drill speeders
- ☐ Drill Twist
- ☐ Drills, attachments, high speed
- ☐ Drills, automatic
- ☐ Drills, bench
- ☐ Drills, fully geared
- ☐ Drills, multiple spdl.
- ☐ Drills, portable elec.
- ☐ Drills, radial
- ☐ Drills, sensitive
- ☐ Drives, variable
- ☐ Emery Wheels
- ☐ End Mills
- ☐ Engraving Machines
- ☐ Etching Mach., elec.
- ☐ Exhaust Blowers
- ☐ Extractors, tap
- ☐ Facers, spot
- ☐ Fans, exhaust, elec. ventilating
- ☐ Files
- ☐ Files, rotary
- ☐ Filing Machines
- ☐ Filing Room Equip.
- ☐ Flangers, hand, pwr.
- ☐ Flexible Shaft Equip.
- ☐ Floating Holders
- ☐ Forges
- ☐ Forging (Upsetting) Machinery
- ☐ Forgings, drop
- ☐ Forgings, upset
- ☐ Forming Machines
- ☐ Foundry Equipment
- ☐ Furnaces, hardness
- ☐ Furnaces, heat treating, Electric
- ☐ Furnaces, heat treating, oil or gas
- ☐ Gages
- ☐ Gage Blocks
- ☐ Gages, comparator
- ☐ Gages, dial
- ☐ Gages, plug, ring, snap
- ☐ Gages, taper
- ☐ Gages, thread
- ☐ Gears
- ☐ Gear Blanks, non-met.
- ☐ Gear Cutting Machy.
- ☐ Gear Testing Machy.
- ☐ Gears, cut
- ☐ Gears, rawhide and non-metallic
- ☐ Gear Pumps
- ☐ Generators
- ☐ Goggles
- ☐ Grease
- ☐ Grinders, pneumatic
- ☐ Grinders, air
- ☐ Grinders, bench
- ☐ Grinders, disc
- ☐ Grinders, external
- ☐ Grinders, flex. shaft
- ☐ Grinders, hand
- ☐ Grinders, internal
- ☐ Grinders, ped., elec.
- ☐ Grinders, swg. frame
- ☐ Grinders, pol., belt
- ☐ Grinding Attach.
- ☐ Grinding, centerless (contract)
- ☐ Grinding Mch., belt
- ☐ Grinding Mch., inter.
- ☐ Grinding Mch., cut., reamer and tool
- ☐ Grinding Machines, portable elec.
- ☐ Grinding Mch., surf.
- ☐ Grinding Mch., tool
- ☐ Grinding Service
- ☐ Grinding Spindles
- ☐ Grinding Wheels
- ☐ Hack Saw Blades
- ☐ Hack Saw Machines
- ☐ Hammers, port., elec.
- ☐ Hammers, drop
- ☐ Hammers, forg. air
- ☐ Hammers, helve riv.
- ☐ Hammers, power
- ☐ Hammers, soft
- ☐ Hammers, steam
- ☐ Hand Saws, p. elec.
- ☐ Hobbing Machines
- ☐ Hobs
- ☐ Hoists, chain
- ☐ Hones
- ☐ Honing Mch., cyl.
- ☐ Hose, rub., metallic
- ☐ Hydraulic Machinery and Tools
- ☐ Index Fixtures
- ☐ Indicators
- ☐ Jig Borers
- ☐ Jigs & Fixtures

Continued on following page

- ☐ Keyseating Machines
- ☐ Knife Grinders
- ☐ Knurling Tools

- ☐ Lapping machines
- ☐ Lapping wheels, dia.
- ☐ Lathe live centers
- ☐ Lathes, auto.
- ☐ Lathes, bench
- ☐ Lathes, polishing & buffing
- ☐ Lathes, precision
- ☐ Lathes, toolroom
- ☐ Lathes, turret
- ☐ Lathes, spinning
- ☐ Lathes, extension bed and gap
- ☐ Lathes, double end
- ☐ Layout fluid
- ☐ Layout plates
- ☐ Lift Jacks
- ☐ Live Lathe Centers
- ☐ Lock Form. Mch., pr.
- ☐ Lubricants
- ☐ Lubricating systems

- ☐ Mandrels, ex. & solid
- ☐ Magnetic chuck demagnetizers
- ☐ Marking machines
- ☐ Meters
- ☐ Micrometers
- ☐ Milling attachments
- ☐ Milling Machines
- ☐ Milling Mch., bench
- ☐ Milling Mch., duplex
- ☐ Milling Mch., hand
- ☐ Milling Machines, Lincoln type
- ☐ Milling Mch., pl. ty.
- ☐ Milling Mch., univ.
- ☐ Milling Mch., horiz.
- ☐ Milling Mch., plain
- ☐ Milling Mch., vert.
- ☐ Milling Mch., uprgt.
- ☐ Mold & Die Cop. M.
- ☐ Molded plastic prod.
- ☐ Molybdenum
- ☐ Motors
- ☐ Motor-generator sets
- ☐ Motor drives, univ.
- ☐ Motor starters

- ☐ Name plates
- ☐ Nibbling Machines
- ☐ Nut setting equip.
- ☐ Nut tappers

- ☐ Oil cups
- ☐ Oil and grease seals
- ☐ Oil groovers
- ☐ Oils, cutting
- ☐ Oils, lubricating
- ☐ Oils, quench. & tem.

- ☐ Patterns
- ☐ Pillow Blocks
- ☐ Pins, leader & dowl.
- ☐ Pipe, cutting and threading mch.
- ☐ Plate Rolls
- ☐ Press Brakes
- ☐ Press Feeds
- ☐ Presses, arbor
- ☐ Presses, bench
- ☐ Presses, broaching
- ☐ Presses, foot
- ☐ Presses, forming
- ☐ Presses, hydraulic
- ☐ Presses, inclinable
- ☐ Presses, power
- ☐ Presses, punch
- ☐ Presses, screw
- ☐ Presses, percussion
- ☐ Presses, straighten.
- ☐ Profiling Machines
- ☐ Pumps
- ☐ Pumps, coolant, lubricant & oil
- ☐ Punching Machy.
- ☐ Punches & Dies
- ☐ Pyrometers

- ☐ Racks, gear, cut
- ☐ Racks, bar stock
- ☐ Radiators, Japanning-oven
- ☐ Reamer Holders
- ☐ Reamers
- ☐ Reamers, adjustable
- ☐ Reamers, taper pin hole
- ☐ Reaming machines
- ☐ Regulators, temp.
- ☐ Rivets
- ☐ Riveting Machines
- ☐ Rod Cutters
- ☐ Rope drives
- ☐ Rotary Converters
- ☐ Rotary Files
- ☐ Router Bits

- ☐ Sand Blast equip.
- ☐ Sanders
- ☐ Saws
- ☐ Saw Sharpening Mch.
- ☐ Sawing Machines, circular & frict.
- ☐ Screw Drivers
- ☐ Saws, cir. met. cut.
- ☐ Screw Cutting Tools
- ☐ Screws, cap, set, saf. set & machine
- ☐ Screw Drivers
- ☐ Screw Mch., auto.
- ☐ Screw Mch., hand
- ☐ Screws
- ☐ Scribers
- ☐ Separators, oil
- ☐ Shapers
- ☐ Shafts, flexible
- ☐ Shafts, hangers and boxes
- ☐ Shapers
- ☐ Shapers, vertical
- ☐ Shapers, structural
- ☐ Shears, bevel
- ☐ Shears, electric
- ☐ Shears, hand
- ☐ Shears, power
- ☐ Shears, slitting
- ☐ Shears, splitting
- ☐ Shears, throatless
- ☐ Shears, rotary
- ☐ Shears, squaring
- ☐ Sheave wheels
- ☐ Shelving, steel
- ☐ Shop lights
- ☐ Sine Bars
- ☐ Slotting machines
- ☐ Sockets
- ☐ Soldering Tools, elec.
- ☐ Speed Reducers
- ☐ Spring coiling and forming machy.
- ☐ Sprockets
- ☐ Stampings
- ☐ Steel
- ☐ Steel Stamps
- ☐ Stocks, die
- ☐ Storage Racks
- ☐ Straightening Mchy.
- ☐ Stripping Units
- ☐ Swaging Machines

- ☐ Tap Holders
- ☐ Tapping Mchy. & At.
- ☐ Taps, collapsing
- ☐ Thread Grind. Mch.
- ☐ Thread Rolling Mch.
- ☐ Tool bits, hi. sp. st.
- ☐ Tool Holders
- ☐ Toolmakers Instrumts.
- ☐ Tools, boring
- ☐ Tools, cutting
- ☐ Tools, filing
- ☐ Tools, lathe & plan.
- ☐ Tools, machinists'
- ☐ Tools, sawing
- ☐ Tracing cloth and paper
- ☐ Transmission, var. sp.
- ☐ Tube Flang. Mchy.
- ☐ Tumbling Barrels
- ☐ Turning Tools

- ☐ Universal Joints

- ☐ Valves, hydraulic
- ☐ V Belts
- ☐ Vises, bench
- ☐ Vises, machine
- ☐ Vises, pipe
- ☐ Vises, planer & shap.

- ☐ Washers, lock
- ☐ Welding Equipment
- ☐ Welding & Cutting Gases
- ☐ Welders, arc
- ☐ Welders, portable
- ☐ Welders, elec. spot
- ☐ Welding Gen., arc
- ☐ Welding Mch., resist.
- ☐ Wire-Working Mchy.
- ☐ Wood-work. Mchy.
- ☐ Wrenches

- ☐ .....
- ☐ .....
- ☐ .....
- ☐ .....
- ☐ .....
- ☐ .....

After checking the items in which you are interested, tear out the page and mail it to The Hitchcock Publishing Company, 508 South Dearborn Street, Chicago, Illinois.

Kindly send catalogs and information on items we have checked.

Name ..... **Title** .....

Firm Name .....

Street .....

City ..... **State** .....

Be SURE to enclose letterhead, billhead, or business card

Classified Section

USED AND REBUILT MACHINERY

Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of $5.00 for your name and address and a five line advertisement. For additional lines, 40c per line.

Write directly to those offering the machine for sale, **for prices and full descriptions. If what you seek is not advertised, write Hitchcock Publishing Company, Chicago, making known your wants on either new or used machinery and the publisher will gladly pass them along to the advertisers.**

FOR SALE BY

Aaron Machinery Co.,
176 Lafayette St., New York, N. Y.

Drill radial, Mueller, 4' m. d.
Drill radial, Morris 3' m. d.
Drill radial, Dreses 3½' m. d.
Grinder, Brown & Sharpe No. 1 universal.
Lathe, Bench, South Bend 9" q. c.
Lathes, drill presses, all sizes.
Lathe, McCabe, two spindle, 44"—66"x14'.
Miller, Kempsmith No. 1 universal.
Miller, Cleveland universal, No. 1, s. p. d
Miller, Rockford No. 2 universal, s. p. d.
Miller, Cincinnati No. 2 universal, s. p. d.
Miller, Van Norman No. 2 universal heads.
Presses, hydraulic, pumps, accumulators.
Saw, shaping, Peerless universal shaping, 12"x13" m.d.
Turret lathes, 26" Libby, 7¼" hollow.
Send us your inquiries.

Joseph Beal & Co.
465 Atlantic Ave., - - Boston, Mass.

SPECIAL OFFERINGS.

Drill, Bausch No. 1, multiple spindle, arranged for 12 spindles, has box table and rectangular hd., ½" cap.
Drill, Bausch No. 1, multiple spindle, arranged for 24 spindles, now equipped with 12 spindles. Has box table and rectangular head, ½" capacity.
Drill press, Colburn No. 2—20" Manufacturing, heavy duty single spindle upright, with plain table and 12 multiple drill spindle attachment. Capacity in high speed drills, in solid steel 1½".
Miller, Ingersoll double vertical spindle, 42x34" between housings; 6' table, motor drive.
Planer, Ohio 36"x36"x8', 2 heads on cross rail, power feed including power elevation, with c./s.

H. F. Wolnick Machinery Co.
9 S. Clinton Street, - Chicago, Ill.

Boring mill, 8' Niles vertical, 2 threads, back drive.
Generator, 6"x11" Gleason, bevel geared.
Lathe, 15x8 Pratt & Whitney.
No. 5 Foster, geared head, power cross fd., s. p. d.
Mill, No. 14½ Becker plain.
Mill, 6x18 Pratt & Whitney, thread.
Mill, No. 33 Kempsmith production.
Planer, Ohio, 24x24x6.
Punch and shear, ½"x10' Cincinnati, motor drive.
Shaper, 24" Smith & Mills.

FOR SALE BY

Globe Machinery Company
602 W. Lake St. Chicago, Ill.

Boring mill, 3½" Beaman & Smith, horizontal, s. p. d.
Lathe, Bridgeford, 28"x12' heavy duty, quick change.
Lathe, 48" gap, Harrington, 15' between centers with 6" raising blocks.
Milling machine, No. 4 Cincinnati.
Milling machine, P. & W. Duplex No. 3½.
Pipe threader, Cox 2½ to 8" cap., motor drive.
Radial drill, Mueller 4', m. d. with tapping att.
Screw machine, No. 4 Millholland, complete.
Screw machine, No. 8 W. & S., with engine bed, taper attachment and sliding turret.
Wire straightener, Wells, capacity ⅛, 3/16, ¼, ⅜.

Alex Zeeve
2280 Woolworth Bldg., New York, N. Y.

Bandsaw, metal-cutting, No. 8 Marvel, a. c., m. d.
Keyseaters, No. 1 Baker, fully equipped; (2) No. 2 Mitts & Merrill.
Lathes, engine, 53"x34' Nicholson-Waterman, geared faceplate, taper; 27"x24' Lodge & Davis, l. c., g.; 24"x16' Whitcomb-Blaisdell q. c., taper; 15"—24"x8' Sebastian gap, q. c., g. h., a. c. m. d.; others.
Planers, 36"x36"x10' Pond, 4 heads; 30"x30"x10' Niles; 24"x24"x7' Gray; others.
Shapers, 25" Smith & Mills, 20" Smith & Mills (clutch in driveshaft), 20" Whipp, all b. g. cone dr., others.

Reliance Machinery Sales Company
1407 Brighton Place, N.S. Pittsburgh, Pa.

Air compressors, 139 and 450 cu. ft.
Borer, car wheel, for 42" wheels.
Bulldozer, No. 9 W. W., 24" stroke, crosshead 16x39½".
Hammers, 50 lb. Mayer upright, m. d.
Miller, No 6 Becker, 62" feed.
Planer, 36"x36"x12' Cincinnati, 2 heads.
Press, No. 21½ Bliss, blanking, m. d.
Press, horning, No. 40 Bliss.
Press, Consolidated, s. s., 5" shaft, 44" wide.
Press, No. 82-C Toledo dbl. crank, 5" shaft, 44" wide.
Press, No. 94-A Toledo dbl. crank, 6" shaft, 6" stroke, 40" wide.
Roller leveller, 54", 17—41" rolls, m. d.
Shapers, 16", 20" and 24", various makes.
Shear, plate, 100" Toledo, ½" plate, m. d.
Slotter, 15" Bement, crank, 36" rot. table.
Wire straightener, ½"x3' Shuster, m. d.
What do you need? What have you for sale?

BLUE BOOK BUYERS' SERVICE

Available To Our Readers

If you will list below the metal-working machines or machine shop equipment in which you are interested and mail to us, we shall be glad to refer your needs to the manufacturers or companies in position to serve you. Replies will come from them—not from us.

If you have any special engineering or shop problem with which you are experiencing difficulty, suggest that you send us full details for reference to our Engineering Service Department.

We are in the market for.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Name .....

Address .....

Please check—

☐ **Interested in new equipment.**

☐ **Interested only in used equipment.**

Mail to the
HITCHCOCK PUBLISHING CO.
508 South Dearborn Street, Chicago, Ill.

USED AND REBUILT MACHINERY

FOR SALE BY

Failor-Strafer Machinery Co.
132 Liberty St., - - New York, N. Y.

Blue print machine, Paragan, type B, size 42. m. d.
Boring mill, 5" bar, D. & H., horiz. floor type.
Drills, 3' and 3½' Cincinnati-Bickford radials.
Drills, radial 6' Cincinnati-Bickford, s. p. d.
Drill radial, Amer. 3' sens., tapping attachment.
Gas furnace, No. 4 American, door opening 8"x14".
Grinder, No. 14 Pratt & Whitney b. b., vert. surface.
Grinder, Oliver 4 wheel wood tool grinder.
Lathe, 26 x10' Walcott, 3 step cone, d. b. g.
Lathe, 13"x6' Willard, 3 step cone, d. b. g.
Lathes, Le Blond, 19", 21", hvy duty, 3 st. cone, d. b. g.
Lathes, 18"x14' and 18"x10' Lodge & Shipleys.
Lathe, 18"x8' American, modern, 3 step cone, d. b. g.
Lathes, 2½"x24" and 3"x36" J. & L., bar equipt.
Pipe machine, 4" Williams, motor drive.
Shears, squaring 12'x3/16" Obl.
Shear, squaring 10'x3/16" Loy & Nawrath, arr. m. d.

FOR SALE BY

Wisconsin Gear & Engineering Co., Inc.
602 So. 2nd Street, - Milwaukee, Wis.

Gear generators, Bilgram bevel, 6" & 16"; guaranteed to be in A-1 condition with all change gears and segments.

Royal Machinery Exchange
401-3 Broome St., - New York City

REBUILT & GUARANTEED MCHE. TOOLS.
Lathes, precision bench, Rivett, Stark, Hardinge.
Lathes, engine, of all sizes and makes.
Millers, No. 1-B Milwaukee plain, s. p., m. d.
Miller, No. 2 Kempsmith universal.
Miller, No. 3 Cincinnati plain, s. p. d.
Miller, No. 3 Cincidnati, plain.
Power presses, o. b. i. of large assortment.

Lang Machinery Company — 28th St. & A. V. R. R. — Pittsburgh, Pa.

Air compressors, Ingersoll-Rand XB-2, 600, 888, 1200 & 1500 cu. ft. 100 lb. pressure, motor drive.
Air comp., WJ-3 Sullivan, angle comp., 468 c. f.
Air comp. 14"x12" Ing. Rand "ER-1". 464 c. f.
Bolt cutter, 1" Landis, 1¼"-3" Acme, sgl. hd., b. d.
Bolt cutters, 1" Acme, Landis hds., 2 & 3 spdl.
Bolt cutter, 2" Acme, Landis head, b. g., b. d.
Boring mill, 30" Bullard, threading attach., s. p. d.
Boring mill, 42" Bullard, 2 swivel heads, s. p. d.
Boring mill, 42" Gisholt, 2 hds., r. p. t., m. d.
Boring mill, 42" Colburn, grd. fds. 2 hds., s. p. d.
Boring mills, 42" and 52" King, r. p. t., m. d.
Boring mill, 52" N. B. P., 2 heads, m. d.
Boring mill, 52" Bausch, geared feeds, d. c., m. d.
Boring mill, 62" Bullard, 2 heads, grd, feeds, m. d.
Boring mill, 96" Niles, 2 heads, b. d.
Boring mill, 10' Niles, 2 heads, belt drive.
Boring mill, 10'—16' Betts, b. d.
Boring mill, hor., 4½" bar Niles, .fl. type, m. d.
Brakes, power, 8' 12 ga., D. & K., leaf type, b. d.
Buffer and polisher, 7½ h. p. Marschke, 220/3/60
Cranes, (2) 5-ton Shaw, EOT., 50' span. 3 mtr., d. c.
Drill, radial, 3' Mueller, t. a., rd. column, m. d.
Drills, upright, 14" to 32", belt drive.
Drill, No. 3 Avey sgl. spdl., 12" o. h., b. d.
Drill, upright 36" Snyder, p. f., b. d.
Drills, 4-spdl. Avey No. 4, b. h., m. d.
Gear cutter, 48"x12" Gould & Eberhardt, s. p. d.
Gear hobber, No. 2 Schuchardt & Schutte, m. d.
Gear hobber, No. 12 Barber Colman, s. p. d.
Grinder, Dillon dbl. end, 7½ h. p., 220/3/60/1750 r. p. m.
Grinder, disc, 18" Diamond, dbl. end.
Grinder, surface, No. 5 Grand Rapids, hyd. feed, m. d.
Grinder, surf. Diamond, 24"x36", hydr. fd., m. d.
Hammer, 30-lb. Bradley upright strap.
Hammer, 100 lb. Bradley cushion helve belt drive.
Hammer, power, 300-lb. Bradley upright helve.
Hammer, power, No. 2-B Nazel, m. d.
Hammers, steam drop, 1000-lb. to 8000-lbs.
Keyseaters, M. & M. No. 4—2½" No 5—3½".
Keyseater, No. 2 Baker, str. 24", cap. 2", b. d.
Lathe, 12"x6' Prentice, geared head, q. c. g., s. p. d.
Lathe, 14"x6' Rockford, q. c. g., d. b. g., b. d.
Lathe, 14"x8' Pratt & Whitney, p. c. g., t. a., b. d.
Lathe, 16"x8' Hendey, q. c. g., t. a., b. d.
Lathe, 18"x10' Hendey geared head, t. a., m. d.
Lathe, 20"x24' Lodge & Shipley, q. c. g., b. d.
Lathe, 21"x10' Le Blond auto. mfg., belt drive.
Lathe, 24"x10' Bradford, q. c. g., t. a., b. d.
Lathe, 24"x14' Schumacher & Boye, q. c. g., b. d.
Lathe, 24"x14' Lodge & Shipley, q. c. g., d. b. g., b. d.
Lathe, 28"x14' Schumacher & Boye, p. c. g., t. a., b. d.
Lathe, 36"x30' Pgh., grd. hd., q. c. g., m. d.
Lathe, 36"x18' American, p. c. g., t. a., b. d.
Lathe, 36"x26' 6" New Haven, p. c. g., b. d.
Lathe, 36"x22" Schumacher & Boye, p. c. g., b. d.
Lathe, 36"x32' L. & S. grd. hd., q. c. g., t. a., m. d.
Lathe, 51"x32' New Haven, triple geared, motor drive.
Lathe, turret, No. 2 Warner & Swasey, b. d., (2).
Lathe, turret, 16" Warner & Swasey, b. d.
Lathe, turret, 20" Bardons and Oliver, p. f., b. d.
Lathe, turret, 21" Gisholt, h. s., 3¼", t. a., b. d.
Lathe, turret, No. 4 Warner & Swasey, b. d.
Lathe, turret, 24"x26" Pratt & Whit., grd. hd., s. p. d.
Miller, duplex, 36."x10' Ingersoll, m. d.
Miller, hand, No. 6 Whitney, b. d.
Miller, plain, No. 3 Cincinnati, b. d.
Miller, plain, No. 3 GH Hendey-Norton, s. p. d.
Miller, plain, No. 24 Brown & S. tbl. 80"x17½" b. d.
Miller, univ., No. 3 Brown & Sharpe, d. h., b. d.
Miller, vertical, No. 1½B Milwaukee, s. p. d.
Miller, vertical, No. 1½ Knight, m. d.
Pipe machines, Landis ½" to 2", belt drive, (2).
Pipe machines, No. 304-B, Oster, m. d.
Pipe machines, 6" Landis gear box a. c., m. d.
Pipe machines, 8" Williams, 2½" to 8" motor drive.
Pipe machine, No. 11½ Merrill, 2½" to 12", motor drive.
Planer, openside, 48"x68"x12' D. & H. 3 hds., m. d.
Press, arch, No. 52 Toledo, str. 4½", m. d.
Press, coining, ELG, 4 Ferracute.
Press, dbl. crank, Stoll 79-D, 72"x26", m. d.
Press, No. 95 Bliss, dbl. crk., str. 3½", m. d.
Press, No. 83 Cleveland, stroke, 2½" roller feed, m. d.
Press, toggle, Garrison, 500 ton, bed, 48"x60".
Presses, wheel, 100-ton Hydraulic.
Profilers, Nos. E3 and E4, Keller, motor drive.
Punch & S., Cleveland, 36" thrt., 1¾"—1", m. d.
Punch, lever, No. 58 Niagara, 36" throat.
Riveting hammer, No. 5½ B high speed, m. d.
Roll, bending, 7'x4", Pyramid Type, b. d.
Saw, band Type JM Laidlaw, cap. 6", m. d.
Saw, shaping Peerless 6"x6", m. d.
Saws, hack 9"x9" Peerless & 8"x8" Atkins.
Screw machine, No. 52 National Acme, s. p. d.
Screw machine, No. 2 Warner & Swasey, b. d.
Shapers, 16", 20", 24" & 28", belt or motor drive.
Shaper, 20" Stockbridge, p. d. f., b. g., m. d.
Shaper, 24" Columbia, d. b. g., gear box, m. d.
Shear, alligator, No. 61 Carlin, 3" round high knife.
Shear, Alligator, No. 7 United Eng. & Fdy. Co.
Shear, billet, R. S. Newbold, 4"x4", m. d.
Shear, billet, No. FV-23 Pels, 3" round cap., m. d.
Shear, Bloom, United 6"x6" hot, m. d.
Shear, rotary, No. 10 Quickwork, 14 ga. 60" throat.
Shear, plate, No. 6 Hilles & J., 92"x¾" 36" gap, m. d.
Slotter, 8" Betts, table 20" dia. b. d.
Straightener, plate, Hertsch 84"x1¼", 7-roll, m. d.
Straightener, No. 1 Kane & Roach cap. ½" rd. m. d.
Straight'er, strip & cut., No. 1 Schuster, 2½"x¼", m.d.
Welders, 200 amp. Gen. Elec.—200 amp. Lincoln.

USED AND REBUILT MACHINERY

FOR SALE BY

General Blower Company
401 N. Peoria St., - Chicago, Ill.

BLOWERS—FANS—EXHAUSTERS.
For Dust Collecting — Ventilating.
Oil and gas burners, cupolas, furnaces, etc.
Roots—Connersville and centrifugal blowers.
What are your blower requirements?

S. M. Regar
P. O. Box 5074-Ybor City Tampa, Fla.

HEAVY MACHINE TOOLS

Boring mill, Bickford single pulley drive, horiz. table 33x60" ..... $ 600
Broaching machine, La Pointe No. 3B, 56" stroke. 450
Lathe, Bement Miles, l. c. g., 36 (factory raising block 44")x22' bed 800
Planer, 5'x5', 20' str., (Location New York City) 2000
Punch, multiple, Thos. SM Co., variable spacing 40" between housing 900
Shear, angle, Morgan Mfg. Co., 6x6x½ 500
Slotter, 16" Bement Miles, circular table 600

Rosenkranz, Weisbecker & Company, Inc.
2308 Singer Building, New York, N. Y.

Boring mills, 60" Betts vertical, motor drive.
Gear cutter, 110" Newton, motor drive.
Grinder, Cincinnati 24", face mill, motor drive.
Keyseater, No. 20 Catlin, m. d.
Lathe, 60"x25' Gleason, motor drive.
Miller, 24"x24"x12' Ingersoll, adj. rail, m. d.
Millers, 2 Ingersoll hor. facing mills, 9" spdls., m. d.
Miller, P. & H. vertical openside, keyseat, m. d.
Planer, 10'x7'x18' Betts, 4 heads, PRT.
Slotter, 18" Niles, vertical, m. d.

Joseph Hyman & Sons,
Tioga and Almond Sts., Philadelphia, Pa.

WORLD'S LARGEST STOCK
POWER PRESSES

No. 7 Bliss, double crank, tie rod, 45°, crank 7"—8".
No. 6C Bliss, doule crank, tie rod, 60°, crank 6—6½" with Marquette air cushions.
No. 5C Bliss, double crank, tie rod, 54", crank 5"—5½".
No. 3A Bliss, double crank, tie rod, 36", crank 4"—4½".
No. SGG 522 Ferracute, dbl. crank, 75°, crank 9"—10".
No. 710 B Niagara, double crk-, 36", crank 6½"—7", (2).
Nos. 93B and 91C, Toledo double crank presses.
No. 2719 Hamilton, straight side, tie rod, crk. 13"—19"
No. 46 Bliss, straight side, stroke 4", crank 8"—13".
No. 76½ Bliss, straight side, tie rod, stroke, 16", crk. 7".
No. 305 Bliss, straight side, tie rod, geared, 6" stroke.
Nos. 54, 55, 55½, 56, 56½ Toledo, geared straight side.
Nos. 3½ B (2) & 3½C Blisstoggle presses.
No. 164½ Toledo toggle, press.
No. 910 B Stoll, toggle press, 7" 8" crank, 9½" draw.
No. 40 & 39B Bliss, Nos. 14½, 14 & 13 Toledo horning.
500 ton Perkins knuckle joint embossing press.
No. 662 Toledo, 250 ton knuckle joint, coining.
150 ton No. EWG 52 Ferracute, 75 ton EG51 Ferracute.
500 ton American Can Coining, 75t. No. E51, Ferracute.
200 ton No. 59 Bliss, 250 ton Waterbury F. coining.
100 ton No. 21 Bliss. 50 ton No. 3 Bliss coining.
No. 3W Bliss wiring presses, (2).
Bliss roll forming machine, 5 pairs rolls for stock up to 28" wide, 4" bearings, weight 25,000 lbs.
Squaring shears, various sizes.
Gang slitter, 60", Braddock, type H.
These and hundreds of others of popular makes and sizes, are in stock at our warehouse here.
Rebuilt and Guaranteed.

FOR SALE BY

Camm-Blades Machinery Co.
612 W. Michigan St., - Milwaukee, Wis.

Bevel gear generator rougher, Gleason 15" spiral, m. d.
Bevel gear generator finisher, Gleason 15" spiral, m. d.
Cutter grinder, Gleason spiral, m. d.

C. R. Daniels
1514 W. Capitol Drive, Milwaukee, Wis.

Air compressor, 6x6 Curtis, sgl., vert. water cooled.
Bending machine, angle iron, No. 14 Excelsior, m. d.
Press, No. 4 Loshbough-Jordon, O.B.I., flywheel
Press, No. 2 Toledo O.B.I., flywheel.
Shear, 8' Ewart & Kutscheid, 14 ga. power squaring.

E. L. Klauber Machinery Co.
3221 Olive St. - - St. Louis, Mo.

Grinders, cutter and tool, Brown & Sharpe, No. 2.
Lathes, No. 3½ Stark, with lever chuck closer, compound and cut-off slides. 10 collets.
Lathes, 14", 16", 18" Monarch, American, Lehmann.
Surfacing machines, continuous belt grinders.
Turret lathes and screw machines.

Russell Machine Co.
438 Oliver Bldg. Pittsburgh, Pa.

Boring mill, 42" Gisholt, 2 heads., m. d.
Boring mill, 10' Niles vertical.
Cranes, 5 ton Shaw, EOT. 50' span, 3 motor. (2)
Gear cutter, 36" Brown & Sharpe.
Hammer, 2500 lb. Chambersburg dbl. frame steam.
48" Morton Keyway cutter, cap. 3½" wide.
Lathe, 36"x30' Pittsburgh geared head, m. d.
Lathe, 52"x22' Pond triple geared.
Lathe, turret, 32"x26" Pratt & Whitney, g. h., b. d.
Pipe cutting and threading machine 6" Merrill.
Planer, openside 48"x48"x12' D. & H., 3 hds., m. d.
Press, hyd. wheel, 250 ton Hydro Press Co.
Press, No. 82 Cleveland, str. 24", roller feed, m. d.
Shaper, 24" Gould & Eberhardt
Shaper; 24" Columbia, d. b. g., gear box, m. d.
Shear, plate, No. 5 H. & J., cap. 90"x¾", m. d.
Shear, Alligator, No. 61 Carlin high knife, 2½" sq.
Upsetting machines, 2½, 3½, 4 and 5" Ajax iron bed.

Sampson Tool Co., Inc.
101 Walker St. - - New York, N. Y.

BARGAINS IN NEW LATHE CHUCKS
FOUR-JAW INDEPENDENT CHUCKS

18"	Steel Alloy	$ 90.00
20"	" "	110.00
22"	" "	120.00
24"	" "	130.00
28"	" "	170.00
32"	" "	240.00
36"	" "	325.00
10"	ALL-STEEL	50.00
12"	" "	65.00
14"	" "	75.00
16"	" "	85.00
18"	" "	105.00
20"	" "	120.00

UNIVERSAL CHUCKS

15"	3-Jaw Universal (Heavy-Duty)	$105.00
17"	4 " "	115.00
19"	4 " "	125.00
21"	3 " "	135.00

USED AND REBUILT MACHINERY

FOR SALE BY

Bradley Machinery Co.
529 E. Jefferson Ave., Detroit, Mich.

A FEW ITEMS (PRICED) FROM OUR STOCK

Antomatic, New Britain, 6 spindle, 1"x5" $1250
Bar shear, Doty (new) 350
Drill radial, 5' Cincinnati Bicklord 1350
Drills, 6 spindle, 2 spindle and single spindle 600
Grinder, chucking, No. 6 Bryant 450
Grinder, surface, No. 33 abrasive, motor in base 750
Grinder, 12x72 Brown & Sharpe, plain 650
Grinder, 10x52 Norton 750
Press, P-3 Ferracute 250
Press, PO-2 Ferracute 150
Press, No. 32 Toledo 150
Press, 150 ton coining, Ferracute 850
Turret lathe, No. 4½ B. & O. 200

Hundreds of other items priced low.

FOR SALE BY

D. E. Dony Machinery Co.
47 Laurelton Rd., - Rochester, N. Y.

Carburizer, American No. 1-F Rotary.
Drill, Avey 4-spindle No. 2.
Drill grinder, Oliver 1½", m. d.
Filters, Fostoria, for cent. grinder.
Shaper, Steptoe 14", m. d.

Bleser Machinery Company
209 N. Sixteenth St., - Springfield, Ill.

Hammer, power trip, 25 lb. Little Giant ..... $ 75
Hammer, power trip, 200 lb. Chiampion 250
Press, punch, 1½" stroke 85
Saws, power hack ..... $20. & up.
Shaper, 32" American, arranged motor drive 395

Marr-Galbreath Machinery Company

Air compressor, 9x8" & 14x12" Ing-Rand.
Ball or jar mill, 2-jars 10x13", belt or m. d.
Blowers, (furnace) No. 2 Knight; No. 3 American.
Blower, pressure, No. 11-PB Am. 14275 cfm., m. d.
Bolt cutter, 1½" Landis, sgl. head.
Boring mill, 30" Bullard vert., threading attach., b. d.
Boring mill, 84" Pond, 2-hds,. Fctn. feed, c/s.
Brakes, hand, 4' Keene, 18 ga.
Brake, 8'x12 ga. Chicago, power, belted.
Brake, hand, 8'x16 ga. Chicago.
Brake, crimp and corrugating, 10'x16 ga. Keene.
Driller, horiz., 6 spindle Nat'l. Acme, No. 2 chucks.
Drill, radial, 2' Am., gear box, s. p. d.
Drill, 22" Champion, b. g., p. f., m. d.
Drills, gang, 3 and 4 spindle, 1 to 4 MT.
Exhauster, No. 35 Buffalo, outlet 12x14", m. d.
Fan, ventilating, 24" American, m. d., 1/60.
Forging machine, 1½" Acme, all steel, side shear.
Furnace, T. J., 25x23x12" I.D. 1700° f.
Gear pinion, No. 3 Sloan & Chase, auto. bench.
Grinder, No. 21 Landis, plain, 10x30" c. s.
Grinder, portable surface, No. 6-OA, motor, 3/60.
Grinder, surface, 36x24" Diamond, hydr. feed, m. d.
Grinder, univ. C. & R. No. 3 B. & S.
Grinding spindle, Excello No. 39, bracket 5002.
Hack saws, No. 2 & 4 Economy, belted.
Hack saws, No. 7 & 14 Atkins, belted.
Hammers, 50 lb. Boss, No. 2, with dies, belted.
Hammer, 100 lb. Little Giant, belted.
Hammer, 200 lb. Bradley upright helve, motor drive.
Hammer, 3000 lb. dble. frame, steam.
Hammer, 300 lb. Beaudry "Champion", b. d.
Hammer, 400 lb. Bliss board drop (rebuilt).
Hammer, 1000 lb. Chambersburg, steam drop, double frame.
Motors, 10-ton Euclid, 3/60/220 (2).
Keyseater, No. 2 M. & M., cap. 1½"x12" belt.
Keyseater, Morton, cap. 2½"x24", s. p. d.
Lathe, No. 4 Rivett, bench, draw-in-att.
Lathe, 11/16"x4' Artisan, q. c. g., s. p. d.
Lathe, 15/22"x8' Sebastian gap bed cone.
Lathe, 18"x6' National, q. c. g; d. b. g., chuck.
Lathe, 18"x10' Hendy, q. c. g., t. a.
Lathe, 22"x12' Rahn-Larmon, pl. change gears, t. a.
Lathe, 26"x10' Wolcott, q. c. g., d. b. g., 2½" h. s.
Lathe, 27"x10' L. & S., 3-step cone, q. c. g.
Lathe, roll, 44" Hyde Park, m. d.
Lathe, 36"x20' Springfield, m. d., 230 v. d. c.
Marking machine, No. 3 Noble & Westbrook.
Miller, No. 2 Cin. univ., (old model), cone.
Miller, hand., No. 2 Kempsmith.
Milling machine, univ. No. 4 B. & S. cone, (old).
Miller, mfg. type, Kempsmith, table 44"x12".
Motors, 15 h. p., West. 3/60/220—440/870 rev.
Motors, 25 h. p., Allis-Chalmers 3/60/220/680 rev.
Motors, 30 & 40 h.p., West., CS. 3/60/220/870 rev.

57 Water St., Pittsburgh, Pa.

Nailing machine, No. 6 Morgan, 8-track, m. d.
Nibbling machine, No. 1 Campbell, 6" thr. 3/16".
Pinion cutter, No. 3 Sloan & Chase, capacity 1x1".
Pipe machine, ½ to 3" Jarecki, belted.
Pipe machine, 4" Williams, cap. ½" to 4", m. d.
Pipe machine, 8" Williams "Rapiduction", m. d.
Pipe machine, 6" Landis, m. d.
Pipe machine, 6" Landis "Lanco", m. d.
Pipe machine, 8" Jarecki, cone or m. d.
Pipe machine, 18" Wieland "Standard", m. d.
Planer, 26"x26"x8' Niles, 1 hd., belt m. d.
Press, arbor, 42" Weaver, hand.
Press, foot, Lewthwaite, wt. 400 lb., (4).
Press, horn, No. 16½ Bliss, plain, stroke 1½".
Press, o. b. i., bench, No. 100-B Perkins.
Press, OBI, No. 4 L-J., 3" stroke, plain.
Press, o. b. i. No. 1 Thomas, 2" stroke, m. d.
Press, punch type, equal 84 Bliss, 10,000 lb.
Press, sgl. crank, 50½ Toledo, str. 8".
Punches, s. s., 26", 45°, 60° cap., 1½"x1", m. d.
Punch & shr., comb., No. 5 Buffalo, hand, cap. ½"x½".
Punch & shear, S. E., 6" th., No. 3 L. & A., rapid a.
Riveter, 3A, h. d., cap. 5/16", high speed, s.p.d.
Riveter, No. 5-A, high speed, cap. ½", m. d.
Riveter, 103 & 120 Grant, m. d.
Rolls, bending, 37x2½", DE, Bertsch & P S & W. 18 ga.
Rolls, 30"x6" United, 2-rolls (for leather).
Saws, metal, 4x4" Napier, m. d.
Saw, shaping, 6x6" Peerless, motor 3/60.
Shaper, 15" Blount, single geared.
Shaper, 16" G. & E. motor 3/60/220. (old).
Shaper, 20" American, cone or m. d.
Shaper, 20" G. & E., B. G. crank, cone.
Shaper, 20" Columbia b. g. crank, gear box, s. p. d.
Shaper, 21" Averbeck, b. g., cone.
Shear, bar, No. 3 United, 24" blade, cap. 2½" sq., m. d.
Shear, Billet, cap 60"x2", m. d.
Shear, Blocks & Blades 52"x½" cap. 1500 lb.
Shear, rotary, ½" throat, 42" belt.
Shear, rotory No. 2 Standard, cap. 10 ga., b. d.
Shear, squar. 8'x18 ga., P. & W., foot power. (new).
Shear, B-36 Stanley Unishear, cap. ½", m. d.
Shear, O-36 Stanley Unishear, cap. 14 ga., m. d.
Straightening rolls, Cleveland 60"x1", m. d.
Tapping machine, 1" Pratt & Whitney, b. d.
Testing machine, 1000 lb. Olsen hyd., hand.
Tiering machines, 600 and 1000 lb. Economy, hand.
Tractographs, Airco No. 1, (4).
Transmission, Reeves No. 00-E. (new)
Turbines, 100 h. p. Westinghouse, 900 rev.
Turret lathe, 18"x6' Springfield, Fox Monitor.
Turret-screw machine, 2½" Acme, cone.
Upsetter, 1½" Acme, all steel.
Welder, arc, 160 amps, a. c., (near new) (2).
Welder, arc, 250 amp., a.c. Hampton (new).

USED AND REBUILT MACHINERY

FOR SALE BY

Segal Machinery Co.

117 S. Clinton St., - Chicago, Illinois

Automatics, 5A and 6A Potter & Johnson & Fays.
Boring mills, 42" Bullard and 60" Colburn.
Brakes, 6' 16 ga. and 8' 10' D. & K. power.
Broaches, V-18 American, Nos. 2 and 3 LaPointe.
Gear hobbers, Nos. 3 & 12 Barber-Colman, m. d.
Grinders, No. 1½ Cincinnati and No. 3 Ohio, t. & c.
Lathes, 14x6, 16x6, 16x8, 20x8 and 24x12, Monarch, LeBlond, Flather & Advance.
Milling machines, Nos. 3 and 4 B. & S. and Cinc. plain.
Punch presses, 540 Max Ams, No. 1 Cons. m. d,
Radial drills, 5' American & Niles-Bement-Pond.
Screw machines, No. 0 B. & S automatic, 1¼"x7" New Britain 6-sp. auto.;—3" Nat. Acme—4-sp. auto.
Shapers, 17", 24" and 28", Walcott & American.
Shears, 4' Streine and 10' Niagara; 10 ga. cap.
Partial list—send us your inquiries.

Chas. E. Lowe Co.

174 Pearl Street Hartford, Conn.

Automatics, 1¼" cone, Madison-Kipp oiling system, 900 serial.
New Britain-Gridleys, 1¼", four spindle, late type.
Model G Gridley, 3", m. d., anti-friction spdls. 17000 ser.
Model G Gridleys, 1¼", m. d., anti-frict. spdls. 8000 ser.
Model J, Gridleys, 3¼, 4¼" single spindle.
Model F Gridleys, 2¼" No. 53; No 55 Acme, m d.
Model H Gridley, 4" Chucker, anti-fric. spdls. 15000 ser.
Cylinder grinders, 12x36; 12x60 Modern.
Model "A" Clevelands, 20", 24", 44".
No. 00 Brown & Sharpe, 5 hole turret, 509 serial.
Thread millers, 3" Waltham, b. d.

Wm. C. Johnson & Sons Machy. Co.

1211 Hadley St., St. Louis, Mo.

Air compressors, 15 in stock.
Automatic, cone, 1", 1¼", 4 spindle, complete.
Bolt threaders, 1", 1¼" & 2" Acme.
Boring machine, 4½ Betts.
Boring mills, 6"—9", 44" Niles.
Broach, 3A LaPointe of Hudson.
Drill, Natco 13 spindle, No. 1 taper.
Drill, No. 2 Fox, 6 spindles.
Drill, Moline hole hog, 5-sp. No. 4 Morse taper.
Drill, radial, 4' Fosdick; 3½' Mueller.
Drill, radial, 3' Cincinnati Bickford.
Gear hobber, No. 3 Adams.
Grinders, 10"x30" and 6"x18" Landis.
Grinders, Pratt & Surface, 12" cup wheel.
Hammers, 300 lb. Beaudry, 75 lb. Bradley, 50 & 100 lb. Little Giant.
Lathe, 14"x8' Hendey belted m. d. taper attach.
Lathes, 16"x6' Greaves Klusman, q. c. g.
Lathes, 22"x12' United States, q. c. g.
Lathe, 27"x16' L. & S. q. c. g.
Miller, Cin. production type, 57"x11" table.
Miller, No. 1½ American.
Miller, No. 2 Rockford plain.
Miller, No. 3 Kempsmith plain.
Pipe machines, 2"—4"—6"—8"—12".
Pipe machine, 2" Landis.
Press, 92B Toledo double crank.
Presses, Nos. 2, 3 & 4 Marshalltown.
Presses, 3, hydraulic pump & accumulator.
Press brake, 10' for 10 ga. Ohl.
Roll, plate straightening, H. & J. No. 2, like new.
Shapers, 12"—16"—20"—24".
Shaper, 24" Columbia, motor driven.
Punches, shears, bulldozers.
Testing machine, 100,000 lb. Riehle.
Large stock guaranteed electric motors. Any size.

FOR SALE BY

Fuchs Machinery & Supply Co.

1102 Farnam St. Omaha, Nebraska

Brake, 10 16-ga. Chicago steel hand.
Brake, 5' 18-ga. Chicago steel hand.
Bulldozer, No. 9 Williams White, many die blocks.
Compressor, Ing Rand 12x10 ER1 358', with motor.
Drill, 2 spindle Henry Wright, bb 15" overhang, with 27x34 prod. table No. 2 M. T.
Drill, 3' American radial, s.p.d.
Drill, 21" Cin. Bickford universal table, t. a.
Drill 22½" Barnes b. g. geared feeds.
Grinder, No. 17 Besley, disc, belt drive.
Grinder, Micro cylinder.
Lathe, 14x10 Sidney, d. b. g., q. c.,
Lathe, 16x8 Lodge & Shipley, d. b. g., q. c.
Lathe, 16x8 South Bend underneath m. d., late type.
Lathe, 18x8 American q. c., d. b. g.
Lathe, 30x16 Lodge & Shipley q. c., s. b. g.
Lathe, 21" Gisholt turret.
Miller, Cincinnati No. 2 universal b. g. cone
Miller, No. 14 Garvin plain, b. g. cone.
Planer, 54x54x20' Pond, 4 heads, b. d.
Press, No. 54 DAG Ferracute, double act cam.
Rolls, 48" 3" dia., belt drive.
Rolls, 10' 3" dia., belt drive.
Saw, No. 2, Ryerson friction saw.
Saw, 6x6 Peerless high speed, m. d.
Saw, 9x9 Peerless, high speed, m. d.
Shear, No. 2 Ryerson serpentine, m. d
Shaper, 16" G & E, cone drive.
Shaper, 24" Stockbridge, s. p. d.
Slotter, 10" Putnam, 27" circular table.
Welder, 30 K. W. Federal spot.

FOR SALE BY

Jones Machine Tool Company

Front & Pike Sts., Cincinnati, Ohio

LATHES

38x12' Boye & E. q. c.	18x10' LeBlond, cone dr.
36x14' Boye & E., c. d.	18x10' Mueller, cone dr.
36x18' Fifield, cone drive.	18x10' Hendey tie bar.
30x12' Putnam, cone dr.	16x8' Monarch cone dr.
24x30' L. & S., cone dr.	13x6' Willard, grd. head.
20x8' Monarch, grd. hd.	13x6' Willard, cone drive.

MILLERS & GRINDERS

No. 3 Kemps. plain, c. d.	24x8' Ingersoll slab mil.
No. 2 hvy. B.-S., pl., c.d.	No. 2 B.-S. surf. grinder.
No. 3 Cinc. plain, c. d.	No. 3 W. & M. Grinder.
No. 34 Ohio pl. c. drive.	No. 33 Abrasive m. d.
No. 4 Cinc., cone drive.	

PRESSES

No. 6-H Toledo, incl.	Mich., s. s., dble. c., 72" between upr.
No. 17 Stoll, inclinable.	
No. 5 Toledo, inclinable.	No. 56 Toledo, sgl. crk.
No. 21 Bliss, incl.	No. 7B Bliss s.s., tie rod.
No. C-5 Ferracute incl.	Ferracute double crank, 36" bet. uprights.
No. 25 Niagara arch.	

SHEARS

No. 05 Nia. circle shear.	72" Niagara foot power, 22" gap.
42" Pexto, foot an. 16 ga.	
36" & 42" Power shear.	48"x16 ga. shear, 12" gap.

MISCELLANEOUS

10'—10G. Ohl Press Brake.
52" Bausch vertical boring mill, cone drive.
Hack saws, Racine and Peerless.
Radial, 4' American, s. p. drive.
Shapers, 24" G. & E., 20 and 16" Ohio, S. & M.
Keyseater, No. 1 Baker and No. 4 Mitts & Merrill.
Pipe machine, 4" Landis. Also 6" Williams.
Turret lathes, No. 6 W. & S., 21" Gisholt.
Screw machines, 2½ and 1¼ Clevelands.
Also 1¼ Gridley 4-spindle.
36x36x12 Gray and 24x6 Ohio Planer, 2 heads.

USED AND REBUILT MACHINERY

FOR SALE BY

Ogden R. Adams
264-266 State St., - Rochester, N. Y.
Main 6374-5

Lathe, 14"x8' LeBlond, q. c. g., d. b. g.
Keyseater, No. 2 Mitts & Merrill, new.
Pantograph engraving machine, No. 1-D Gorton.
Radial drill, 5' American, full universal.

Wigglesworth Machinery Co.
201 Bent Street Cambridge, Mass.

Automatic, No. 00 Brown & Sharpe.
Brake, 12'-¼" Dreis & Krump apron, m. d.
Grinder, No. 1½ Landis, universal.
Lathe, 16"x12' Walcott.
Lathe, 18"x12' Rockford.
Lathe, 32"—64"x11' Fay & Scott, gap.
Lathe, 48" Putnam cup wheel, m. d.
Miller, No. 2 Brown & Sharpe, univ. (2).
Planers, 42"x42"x10' Detrick & Harvey, openside.
Turret, 2 spindle, J. & L., steel head.
Turret 26", Libby, 7⅛" hole.
Turret, 24" Libby, 6¼" hole.
Send for Complete List.

FOR SALE BY

The Elyria Belting & Machinery Co.
Elyria - - - - - Ohio

UNBREAKABLE NEW MACHINISTS VISES.
Made entirely of drop-forged steel.
Only a limited number left.

3" swivel	$5.50.	3" stationary	$4.50.
4½" swivel	$7.75.	4½" stationary	$6.75.
		5" stationary	$7.50.

Write for circular.

Standard Machinery Co.,
347 Indiana Ave. Grand Rapids, Mich.

Boring mill, 34" Colburn vertical.
Grinder, cylinder, Heald No. 65.
Grinder, drill, Sellers 3" capacity.
Grinder, No. 4 Badger disc, motor driven.
Lathe, 24—42"x12' Fifield, c. h.
Lathes, Porter-Cable Mfg. (2).
Miller, model C-1 Becker heavy vertical.
Planer, 30"x30"10' Gray, double head.
Shaper, 24" Hamilton.
Shear, No. 13 Pettingell rotary, 14 ga.
Welder, type 150 Toledo 20 kw spot welder.

West Penn Machinery Company
1210 House Building, Pittsburgh, Pa.

Air compressors, 30 to 2500 cubic feet.
Air compr. portable gas 1-R 180 cu. ft.
Blower, No. 4 Roots, capacity 2110 c. f. m.
Bolt cutter, 1" Landis, double head, b. d.
Bolt cutters, 2" & 3" Acme, b. d.
Bolt threaders, automatic, Landis ⅛", m. d.
Boring mill, 42" Bullard, 2 heads.
Boring mill, 66" Betts, 2 heads, belt drive.
Bulldozers, Nos. 3, 4, 6, 9, 25, & 30.
Brake, 10'—14 ga., D. & K., hand.
Crusher, jaw, No. 4 Chiampion, b. d.
Draw bench, 30,000 lbs. W.-F., 22' draw., m. d.
Drill sharpener, Ing.-Rand "Leyner", 1¼".
Drill, radial 6' Reed-Prentice, single pulley drive.
Drills, 4 spindle Avey No. 2 m. t., s. p. d.
Drills, upright 10" to 36".
Engine, gas, 20 horse power Bessemer.
Flanger, McCabe, ½" capacity, dies.
Gear cutters, Nos. 5 & 6 B. & S., 60" & 72" m. d.
Gear cutters, 11", 18" & 24" Gleason.
Gear tester, bevel 18" Gleason.
Grinders, centerless Heim, m. d., 220/3/60.
Grinder, disc, No. 4 Gardner, 22" 220/3/60.
Grinder, drill, No. 31 Oliver, 1½", m. d., 220/3/60.
Grinder, knife 10' Bridgeport, m.d.
Grinder, roll, Farrel 30"x76"
Grinder, surface, No. 2 B. & S., m. d., 220/3/60.
Grinder, surface, No. 1 Diam. 14x24, mag. chuck, m. d.
Grinders, D. E. 2—3 & 5 h. p., 220/3/60.
Grinder, T. & C. No. 1 LeBlond, m. d.
Grinder, disc, No. 8—20" Besly, belt drive.
Hammers, 50 lb., 75 lb. 100 lb., 200 lb. Upright.
Hammer, power, 100 lb Bradley cushion helve.
Hammers, Nos. 2-B, 3-E, 4B, 6-B, Nazel.
Hammers, steam, forging & drop.
Keyseater, No. 2 Mitts & Merrill, belt drive.
Lathe, 26"x12' Putnam, q. c. g., d. b. g.
Lathe, 42"x16' Schumacher Boye, q. c. g., belt drive.
Lathe, 48"x30' New Haven, 22' centers, b. d.
Lathe, turret, No. 2 Warner & Swasey, belt drive.
Lathe, turret, No. 1 Garvin, belt drive
Lathe, wheel, 78"x84" Bement, motor drive.
Lathe, spinning 32" belt drive.
Locomotive, gas, 6 ton Milwaukee, 36".
Miller, vertical No. 2 Knight, b. d.
Mixers, Sprout-Waldron, batch & liquid.
Pipe mche., 2", 4", 6", 8" & 12" Landis-Oster-Williams.
Planer, openside, 48"x48"x14' D. & H., m. d.
Press, forging, 150 ton United, steam hyd.
Press, wheel 150 ton Caldwell, 42", b. d.
Press, hydraulic 100-ton Southwark.
Presses, OBI, No. 19 Bliss & No. 4 Niagara, 2" str.
Press, No. 55 Toledo, bed 20x19.
Press, screw, No. 87 Niagara, hand power.
Press, 6 spindle, Waterbury-Farrell.
Press, arch, No. 30 Bliss, roll feed, b.d.
Pumps, centrifugal 6", 4", 1", motor drive.
Punch, comb., No. 12 Badger, ⅜"—4; 1½" round.
Punch, EF Cleveland, 36" throat, 1½" thru 1".
Punch, multiple, 32E W & W, 10' 2".
Punch, horiz. No. 7 Kling, m. d., 220/3/60.
Riveters, air, hammer, spinning.
Rolling mill, cold 9"x18" motor drive.
Saws, friction, Nos. 2, 3 & 4 Ryerson motor drive.
Saw, cold, 48" Newton motor drive.
Shapers, 16", 20", 24" & 36 Gould & Eberhardt.
Shears, alligator, 1½", 2", 3", 4" & 6".
Shear, Angle 6x6x1 Long & Allstatter, m. d.
Shear, Niagara 42"x14 ga., belt drive.
Shear, Niagara 42"x10 ga., belt drive.
Shear, No. 162 Niagara, 62"x18 ga., b. d.
Shear, Stoll 60"x3/16", motor drive.
Shear, 8'x14 ga. Ohl, m. d., 110/220/1/60.
Shear, 10', 18 ga. Niagara, b. d.
Shear, circle, Niagara, 4" cutters, 16 ga.
Shear, circle No. 3 Bliss, 40"x20 gauge.
Shear, Guill., No. 5 H. & J., 4½" rd., m. d.
Shear, guill, No. 2 H. & J., 2½" rd. b. d.
Shear, 10'x¼" Bliss, holddown, b. d.
Shear, plate, 96"x½" Toledo, m. d.
Shear, plate, No. 6 H. & J., 84"x⅜", m. d.
Sitter, gang, No. 2 W-F. 18", belt drive.
Slitter, gang, 36" Yoder motor drive.
Sitter, gang, 36" Braddock, belt drive.
Slotters, 6" & 24" Newton.
Straightener, 12"x¼" Shuster, b. d.
Straightener, 12"x½" Shuster, b. d.
Straightener, AS & TP 12"x3/16", belt drive.
Straightener, 48" Aetna-Standard, 17 roll 3½", m. d.
Thread rollers, W-F No. 20—8"
Tumbling barrel, 34"x48", belt drive.
Upsetters, 1" to 6".
Welders, spot, 12, 13 & 18 K. V. A.
Welders, arc, 200 & 300 amp. Lincoln.

USED AND REBUILT MACHINERY

MISCELLANOUS WANTS

WANTED

TAPS-TWIST DRILLS-FILES
CUTTERS-ENDMILLS-SAWS
HACK SAW BLADES

WE WILL BUY YOUR SURPLUS TOOLS

WESTERN TOOL EXCHANGE
18 N. Halsted Street Chicago, Illinois
SURLUS BOUGHT AND SOLD

FOR LEASE

SPACE 50' x 100' IN WELL LIGHTED, HEAVY CONSTRUCTED FACTORY BUILDING, SPRINKLERED. SUITABLE FOR ANY KIND OF MANUFACTURE. ALSO, TENANT MAY HAVE USE OF MODERN MACHINE TOOL EQUIPMENT. LOCATED NEAR RAILROAD STATION IN FAIRFIELD, CONNECTICUT.

THE HEIM COMPANY
Fairfield, Connecticut.

FOR SALE BY

B. D. Brooks Co., Inc.
19 Broad St. Boston, Mass.

Sheet metal working machinery, hand and power.
All types of new and reconditioned equipment.
Apron brakes, press brakes, shears, folders,
Bending rolls, corrugating rolls, forming rolls.
Punches, beaders, rotary machines, stakes, etc.

The Reeve-Fritts Company
8 N. Clinton St., Chicago

Boring machine, No. 1 Barrett, cylinder.
Drill, No. 3 Barnes horizontal, double head.
Drill, 28" Fosdick radial, round column.
Gear hobber, No. 1 Adams Farwell.
Grinder, Gisholt universal.
Lathe, 22"x14' Davenport, g. c. g.
Saw, cold, Lea-Simplex, 14".
Screw driver, No. 2 Reynolds, auto. feed.
Screw machine, 3" Cleveland automatic "A".
Turret lathe, 19" P. & W., geared head.

Nelson Machinery Co., Green Bay, Wis.

Drill, 5 ft. Bickford No. 2 radial, geared m. d.
Drill, 28" sliding hd.,—H. W. L. & G. P. F.—belted.
Grinder, Cochrane Bly No. 11 Sauto. saw, cap. 16" to 32".
Grinder, Niles-B-P. 12x36 Universal Mfg., belted.
Hobber, Barber Colman No. 12.
Lathe, 36"x14'—6" L. & S. patent hd., q.c., 2 3/16 hole.
Press, No. 21 Bliss OBI, 2" stroke.

FOR SALE BY

The Mutual Mfg. & Supply Co.
2933 Spring Grove Ave., Cincinnati, O.

Chaser grinder, Landis, belt drive, with 2 h. p. G. E. 220-440 volt 60 cycle, 3-phase motor, reasonable.

The F. E. Worch Machinery Co.
P. O. Box 202 Columbus, Ohio.

Drill, 4 spdl. Francis Reed, ¾" cap.
Grinder, Cyl. 5"x15", Ott.
Grinder, Sellers No. 2SW tool, arr. for motor.
Lathe 25"x14' LeBlond, q. c. g. d. b. g., chuck.
Press, cam, Ferracute, 50 ton.

Grand Machinery Exchange, Inc
148 Centre St., - New York City

Boring mill, 3½" bar Detrick & Harvey hor., floor type.
Lathe, 37"x14' Fay & Scott.
Milling mchs., B. & S., Cincinnati, Kemps. pl. & univ.
Milling machines, No. 3 Sohner & Adams rotary.
Presses, power, Nos. C5 & C6 Ferracute incl., m. d.
Press, 36" West, dbl. crank, b. g., 5" str., 5" crankshaft.

Davis Machinery Company
1-3-5 So. St. Clair St. Toledo, Ohio

Brake, 4'x3/16" Chicago, power, leaf type, m. d.
Lathe, 26"x16' Rahn Larmon, q. c. g.
Mill, No. 3½ Ohio hy. duty, plain.
Press, No. 54-S Toledo s. s. gd., 8" stroke.
Press, 50 ton H. & W., dieing machine, m. d.

FOR SALE — GOOD TOOLS

Automatic, B. & S., No. 00, Ser. 6805 **$750.**
Automatics, Gridley, 1¾", model "F", 4-spindle Automatic, Ser. 8288,..... **$750.**
Boring Mills, 42" Bullard, New Era, with Side Head, R.P.T. Quick Change, M. D.... **$7,000.**
50" Bullard Rapid Production Boring Mill, 2 swivel heads on rail, Serial 5495,..... **$1,500.**
Drill, Barnes 34", Sliding Hd., Tap. Att.. **$275.**
Lathe, 12"x6' Carroll-J. S.Q.C. Fair.... **$125.**
Broach, No. 1 LaPoint for castallating **$200.**
Threader, Namco, 2-sp., ⅝" Cap..... **$200.**
Miller, No. 2, Craftsman Rotary..... **$750.**
Tapper, ¼" Hart-Hageman, Auto..... **$250.**
Flame Cut., Hancock 01, 18x18, Gas **$200.**

BANSBACH MACHINERY CORP.
3845 West Madison Street, Chicago

If you want to SELL IT...
TELL IT to our
BLUE BOOK
Readers!

CONSIDER GOOD USED EQUIPMENT FIRST!

IMMEDIATE AVAILABILITY AND DELIVERY ARE IMPORTANT FACTORS

AIR COMPRESSORS
1055 cu. ft. Chgo. Pneu., CCE. Two Stage 22"x14"x16", M.D. 100 lb. Pressure
1300 cu. ft. Chgo Pneu., OCE. 20"x12"x14", M.D. 125 lb.pr.

BALERS
Loge. Baler, Bales 7"x7"x16" Loge. Baler, 14P Hor. Hyd. Box 58"x22"x16". Makes Bales 10"x16"x10".

BENDING ROLLS
10' Bertsch Initial Type, Motor Driven. Capacity 1¼" Plate
10' Kling, MD. Capacity ¼"
20' Niles, M. D., Capacity ¼"

BORING MILL—HORIZ.
8" bar Barrett Cyl. Bor. B.M.D.

BRAKE—LEAF TYPE
6' D.&K. "Chicago" No. 167 Motor Driven, Capacity ¼"

BRAKES—PRESS TYPE
6' Dreis Krump, M.D., Cap.¼"
8'6" Loy & Naw., M. Dr. Cap. No. 10 Ga.

CRANES—OVERHEAD ELECTRIC TRAVELING
5 ton Bedford 35' 6" Span, 220/3/60 AC
10 ton North, 49' Sp. 220V.DC
10 ton American 59'10" Span, 220/3/60 AC
10 ton Northern 66' 9" Span, 440/3/60 AC
10 ton Champion 85'11" Span, 440/3/60 AC
20 ton Morgan 50' Span, 220 Volt DC 5 ton Auxiliary
20 ton Morgan 62' Span, 230 Volt DC 10 ton Auxiliary

CRANE—GANTRY
4 ton Link Belt, 100' Span 220/3/60 A.C. With 2 Yd. Williams Clam Bucket

DRAW BENCHES
10,000 lb. Richard, Arr. for M. D. Bed 25' Long, 18' Draw
20,000 lb. D. & B. B.D., 40'Drw.
25,000 lb. Draw Bench, Arr. B.M.D. Bed 35' Long. Equip. with Aetna Pusher & Hyd. Eq. for operation
100,000 lb. Aetna No. 3, Eqp. with Aetna Pusher, Cap. to draw 1" to 4" sq. bars

FORGING MACHINES
¾" to 7" Ajax, Nat. Acme,St.Fr.

GEAR REDUCTION UNITS
1500H.P. Falk Herringb. G D., 234 RPM to 26 RPM
2500H.P. Gen. Elec. Gear Drive
1500 H.P. Mesta Sgl. Red. Gr. Drive at 300 RPM
500 H.P. Falk Double Redne. Gr. D., 646 RPM to 35 RPM

HAMMERS—BOARD DROP—STEAM DROP—STEAM FORG.
1000 lb. to 8000 lb. Chamb., B. & Sp. Erie, N-B-P. Morgan

JOGGLING MACHINE
No. 2 Morgan Plate, M.D. Cap. to toggle ¼" Plate 42" f. edge

LATHE—ROLL
44" Hyde Park Dble. Roll Lathe, M.D. 33' Bed, head stock at each end, 22' betw. centers.

LATHE—WHEEL
90" Niles Hvy. Driv. Whl. Lathe, M.D. Two face plates 90" dia. & 14" wide, equip. 4 c. j.

LEVELLER — ROLLER
48" Aetna 17 Rolls 3-¾" Dia. Arr. M.D. Cap. 10 Ga. & Lgt.

MIL. MCHS.—PLAN. TYPE
30"x24"x12' Ingersoll Horizontal Inclined Rail Type, M.D.
48" Newton Horizontal Adj. Rail Type, M.D. 59" Betw. Housings. Table 42"x12'4"

PLANERS
48"x48"x16' Cinc. 2HD., MD.
72"x60"x31' Pond 2-Head, B.D.
100"x84"x25' P'd 4-Hd.,B.M.D.

PLANERS—OPENSIDE
48"x48"x16' D.&H. 3 H.,BMD
60"x52"x22' Lib. 3 Hd., M.D.

NO. 2 HILLES & JONES PLATE STR. ROLL Six 10" Diam. Rolls Cap. 1 2" Plate M.D. Incl. A.C. Motor

PRESSES—HYDRAULIC
300 tn Chambersb. Self-Cont. 4 Col. Hydro-Pneu. P., 12" Dia. of Ram, 18" Str., 49" Bet.C.
750 ton Mesta Four Col. Forg. Press, 30" Dia. of Ram, 24" Str., 5' Between Columns
3000 ton Wood Four Col. Forg. Press, 36" Dia. of Ram, 24" Str., 22"x41" Betw. Columns

PRESS—STRAIGHT SIDE
No. 36F Toledo Double Crank, 12" Str 124" Bet. Uprights

PUNCH—BEAM
Kling Beam Punch & Cop. Mch., Arr. for M.D. Cap. to cope or notch 6" to 24" I-beams, Eqp. to punch 6 1" holes in ¼" plate; str. 6" chan. or I-beams

PUNCH—MULTIPLE
HILLES & J. No 7, 98" Betw. Hous., 18" Thr., M.D., Cap. to punch 40 13/16" holes thru ¾" plate. Equipment Thomas Spac. Table 22'6" long.

PUNCH & SHEAR COMBINATIONS
No. 6 Beatty Dble. End, M.D. 16" Thr. Cap.Punch1" thru1"
No. 14 Wil. & W. Sgle. End, M. D. Lysholm Table Cap. Punch 1¼"x1" Throat 48"
Hill. & J. Punch, Sgl. End, M.D. Thr. 60" Cap. Punch 2" thru 1¼ with Lysholm Table
Type G Clev. Sgle. End, Arr. for M.D. 12" Throat. Cap. Punch 2" thru 1".

ROLLING MILLS
9" Belgian Bar Mill, Consisting of two 3 high roughing stands 12"x54"; finishing stand 2 stands 2 high 9" x 13", 3 stands 3 high 9"x30"
10"x9" Acme Four Stand 2 High
10¼"x12" UE&F Sgl. St. 2 Hi.
14"x42" Gar. Sgl. Stand 2 Hi.
16"x20" Wat. F. Sgl. Std. 2 Hi.
22"x28" Univ. 3 High Mill complete install. incl. motor
19" Morgan 8 Stand Contin. Sheet Bar and Skelp Mill with 3 Stands of Vertical Rolls
24" Mackintosh Merch. Bar Mill, One 3High Stands. One 2 High Bull Head Stand
30" Morgan 3 High Bill. Mill
44" Bloom. Mill. Consist. Pinion Stand, Rol .Tbl & Catch T.

SAW No. 4 Ryerson H. Sp. Fric. Hyd. Feed Mec. Complete with 3 H.P. Motor

SHEAR—ALLIGATOR
No. 2 Doelger & K., Arr. for B. M.D. Cap' ¾" Rd., 2-¾"Sq.

SHEARS—ANGLE
4"x4"x¾" L. & A. Dbl. Angle Shear Arr. motor drive
6"x6"x¾" Hilles & J. No. 2 Dbl. Angle Shear, Arr. M.D.
8"x8"x1" L. & A. Size C Dbl. Angle Shear, Motor Driven

SHEARS—BAR
No. 3 Hilles & Jones Guill. Type Arr. for M.D. Cap. Shear 3" Round, 2-¾" Square, 10"x1¼" Flats, 6"x6"x¾" Angles
No. 10 Buffalo Armor Plate Belt or M.D. Cap. shear 3-5" Rounds, 3¼" Squares, 8"x1¼" Flats, 8"x8"x¾" Angles

SHEAR—GATE
12' Beatty Mche. Mfg. Co. M.D. Cap. ¾" Plate

SHEAR—ROTARY
No. 40A Quickwork Rot. Shear Arr. M.D. Cap. ¼" Plate Comp. with Circle Cut. Attach

SHEAR—ROTARY FLYING
United Engr. & Fdry. Co.,MD 1" Rds. up to 7"x2" Flats

SHEARS—SQUARING
96" Bliss No. 465, M.D. ¼" Pl
12' Bertsch, Ar.M.D., Ca.3/16"

STRAIGHTENER
¾" Hallden No. 2 Strtng. & Cut off Mch., Arr. M.D. 12' Cut-of
No. 0 Medart, Arr. for M.D. Timken Equipped. Capacity ¼" to 1½" dia. any length
No. 2 Sutton-Ab. Strtnr, M.D. Cap. Solid Bars 1¼" to 3½" Dia. Tubes, 1¼" to 4-¾" O.D.
¾", 3/16", ¼" ¼" Shuster Rot Str.tng. & Cut-off Mchs.

TESTING MACHINE
200,000 lbs. Olsen Universal Screw Rot. Nut Type, M.D.

WIRE DRAWING MACHINE
Waterb. F. 7-Die Tandem Cap ¼" to No. 11 B & S Ga.
Vaughn Motobloc, No. 12-22 Arr. M.D. draw stock to 1 1/16" Dia. or fin.. wire 1"D

Entire Surplus Manufacturing Equipment Inventories Purchased.
Appraisals. Liquidations. Consulting Engineering Service.
Bona Fide Auctions arranged.

EQUIPMENT AVAILABLE for practically any type of manufacturing requirement

RITTERBUSH & COMPANY, INC.

NEW YORK 30 CHURCH ST. PH. CORTLAND 7-3437-3438
PITTSBURGH PARK BUILDING PH. ATLANTIC 1208
CABLE ADDRESS: RITTERBUSH, NEW YORK

USED AND REBUILT MACHINERY

MISCELLANOUS WANTS

WANTED

TAPS-TWIST DRILLS-FILES
CUTTERS-ENDMILLS-SAWS
HACK SAW BLADES

WE WILL BUY YOUR SURPLUS TOOLS

WESTERN TOOL EXCHANGE
18 N. Halsted Street Chicago, Illinois
SURLUS BOUGHT AND SOLD

FOR LEASE

SPACE 50' x 100' IN WELL LIGHTED, HEAVY CONSTRUCTED FACTORY BUILDING, SPRINKLERED. SUITABLE FOR ANY KIND OF MANUFACTURE. ALSO, TENANT MAY HAVE USE OF MODERN MACHINE TOOL EQUIPMENT. LOCATED NEAR RAILROAD STATION IN FAIRFIELD, CONNECTICUT.

THE HEIM COMPANY
Fairfield, Connecticut.

FOR SALE BY

B. D. Brooks Co., Inc.
119 Broad St. Boston, Mass.

Sheet metal working machinery, hand and power.
All types of new and reconditioned equipment.
Apron brakes, press brakes, shears, folders,
Bending rolls, corrugating rolls, forming rolls,
Punches, beaders, rotary machines, stakes, etc.

The Reeve-Fritts Company
28 N. Clinton St., Chicago

Boring machine, No. 1 Barrett, cylinder.
Drill, No. 3 Barnes horizontal, double head.
Drill, 24" Fosdick radial, round column.
Gear hobber, No. 1 Adams Farwell.
Grinder, Gisholt universal.
Lathe, 25"x14' Davenport, g. c. g.
Saw, cold, Lea-Simplex, 24".
Screw driver, No. 2 Reynolds, auto. feed.
Screw machine, 3" Cleveland automatic "A".
Turret lathe, 19" P. & W., geared head.

Nelson Machinery Co., Green Bay, Wis.

Drill, 5 ft. Bickford No. 2 radial, geared m. d.
Drill, 28" sliding hd.,—H. W. L. & G. P. F.—belted.
Grinder, Cochrane Bly No. 11Sauto. saw, cap. 10" to 32".
Grinder, Niles-B-P. 12x36 Universal Mfg., belted.
Hobber, Barber Colman No. 12.
Lathe, 36"x14'—6" L. & S. patent hd., q.c., 2 3/16 hole.
Press, No. 21 Bliss OBI, 2" stroke.

FOR SALE BY

The Mutual Mfg. & Supply Co.
2933 Spring Grove Ave., Cincinnati, O.

Chaser grinder, Landis, belt drive, with 2 h. p. G. E. 220-440 volt 60 cycle, 3-phase motor, reasonable.

The F. E. Worch Machinery Co.
P. O. Box 202 Columbus, Ohio.

Drill, 4 spdl. Francis Reed, 4" cap.
Grinder, Cyl. 5"x18", Ott.
Grinder, Sellers No. 25W tool, arr. for motor.
Lathe 25"x14' LeBlond, q. c. g. d. b. g., chuck.
Press, cam, Ferracute, 50 ton.

Grand Machinery Exchange, Inc
148 Centre St., - New York City

Boring mill, 3½" bar Detrick & Harvey hor., floor type.
Lathe, 37"x14' Fay & Scott.
Milling mchs., B. & S., Cincinnati, Kemps. pl. & univ.
Milling machines, No. 3 Sohner & Adams rotary.
Presses, power, Nos. C5 & C6 Ferracute incl., m. d.
Press, 36" West, dbl. crank, b. g., 5" str., 5" crankshaft.

Davis Machinery Company
1-3-5 So. St. Clair St. Toledo, Ohio

Brake, 4'x3/16" Chicago, power, leaf type, m. d.
Lathe, 26"x16' Rahn Larmon, q. c. g.
Mill, No. 34 Ohio hy. duty, plain.
Press, No. 54-S Toledo s. s. gd., 8" stroke.
Press, 50 ton H. & W., dieing machine, m. d.

FOR SALE — GOOD TOOLS

Automatic, B. & S., No. 00, Ser. 6805 **$750.**
Automatics, Gridley, 1¾", model "F", 4-spindle Automatic, Ser. 6288..... **$750.**
Boring Mills, 42" Bullard, New Era, with Side Head, R.P.T. Quick Change, M. D.... **$7,000.**
50" Bullard Rapid Production Boring Mill, 2 swivel heads on rail, Serial 5495..... **$1,500.**
Drill, Barnes 34", Slid. Hd., Tap. Att.. **$275.**
Lathe, 12"x6' Carroll-J, S.Q.C. Fair.... **$125.**
Broach, No. 1 LaPoint for castallating **$200.**
Threader, Namco, 2-sp., ⅝" Cap..... **$200.**
Miller, No. 2, Craftsman Rotary..... **$750.**
Tapper, ¼" Hart-Hageman, Auto..... **$250.**
Flame Cut., Hancock 01, 18x18, Gas. **$200.**

BANSBACH MACHINERY CORP.
3845 West Madison Street, Chicago

If you want to SELL IT...
TELL IT to our
BLUE BOOK
Readers!

CONSIDER GOOD USED EQUIPMENT FIRST!

IMMEDIATE AVAILABILITY AND DELIVERY ARE IMPORTANT FACTORS

AIR COMPRESSORS
1055 cu. ft. Chgo. Pneu., CCE. Two Stage 22"x14"x16",M.D. 100 lb. Pressure
1300 cu. ft. Chgo Pneu., OCE. 20"x12"x14", M.D. 125 lb.pr.

BALERS
Loge. Baler, Bales 7"x7"x16" Loge. Baler, 14P Hor. Hyd. Box 58"x22"x16". Makes Bales 58"x16"x16"

BENDING ROLLS
10' Bertsch Initial Type, Motor Driven. Capacity 1¼" Plate
10' Kling, MD. Capacity ½"
20' Niles, M. D., Capacity ¾"

BORING MILL—HORIZ.
8" bar Barrett Cyl. Bor. B.M.D.

BRAKE—LEAF TYPE
6' D.&K. "Chicago" No. 167 Motor Driven, Capacity ¾"

BRAKES—PRESS TYPE
6' Dreis Krump, M.D., Cap.¾" 8'6" Loy & Naw., M. Dr. Cap. No. 10 Ga.

CRANES—OVERHEAD ELECTRIC TRAVELING
5 ton Bedford 35' 6" Span, 220/3/60 AC
10 ton North. 49' Sp. 220V.DC
10 ton American 59'10" Span, 220/3/60 AC
10 ton Northern 66' 9" Span, 440/3/60 AC
10 ton Champion 85'11" Span, 440/3/60 AC
20 ton Morgan 50' Span, 220 Volt DC 5 ton Auxiliary
20 ton Morgan 62' Span, 230 Volt DC 10 ton Auxiliary

CRANE—GANTRY
4 ton Link Belt, 100' Span 220/3/60 A.C. With 2 Yd. Williams Clam Bucket

DRAW BENCHES
10,000 lb. Richard, Arr. for M. D. Bed 25' Long, 18' Draw
20,000 lb. Dr. B. B.D., 40'Drw.
25,000 lb. Draw Bench, Arr. B.M.D. Bed 35' Long. Equip. with Aetna Pusher & Hyd. Eq. for operation
100,000 lb. Aetna No. 3, Eqp. with Aetna Pusher. Cap. to draw 1" to 4½" rd. bars

FORGING MACHINES
¾" to 7" Ajax, Nat. Acme,St.Fr.

GEAR REDUCTION UNITS
1500H.P. Falk Herringb. G D., 234 RPM to 26 RPM
2500H.P. Gen. Elec. Gear Drive
1500 H.P. Mesta Sgl. Red. Gr. Drive at 320 RPM
500 H.P. Falk Double Redne. Gr. D., 646 RPM to 35 RPM

HAMMERS—BOARD DROP—STEAM DROP—STEAM FORG.
1000 lb. to 8000 lb. Chamb., B. & Sp. Erie, N-B-P. Morgan

JOGGLING MACHINE
No. 2 Morgan Plate, M.D. Cap. to joggle ½" Plate 42" f. edge

LATHE—ROLL
44" Hyde Park Dble. Roll Lathe, M.D. 33' Bed, head stock at each end, 22' betw. centers.

LATHE—WHEEL
90" Niles Hvy. Driv. Whl. Lathe, M.D. Two face plates 90" dia. & 14" wide, equip. 4 c. j.

LEVELLER — ROLLER
48" Aetna 17 Rolls 3-¾" Dia. Arr. M.D. Cap. 10 Ga. & Lgt.

MILL. MCHS.—PLAN. TYPE
30"x24"x12" Ingersoll Horizontal Inclined Rail Type, M.D.
48" Newton Horizontal Adj. Rail Type, M.D. 50" Betw. Housings. Table 42"x12'4"

PLANERS
48"x48"x16' Cinc. 2HD., MD.
72"x60"x31' Pond 2-Head, B.D.
100"x84"x25' P'd 4-Hd.,B.M.D.

PLANERS—OPENSIDE
48"x48"x16' D.&H. 3 H.,BMD
60"x52"x22' Lib. 3 Hd., M.D.

NO. 2 HILLES & JONES PLATE STR. ROLL Six 10" Diam. Rolls Cap. 1 /2" Plate M.D. Incl. A.C. Motor

PRESSES—HYDRAULIC
300 tn Chambersb. Self-Cont. 4 Col. Hydro-Pneu. P. 12" Dia. of Ram, 18" Str. 49" Bet.C.
750 ton Mesta Four Col. Forg. Press, 30" Dia. of Ram, 24" Str., 5' Between Columns
3000 ton Wood Four Col. Forg. Press, 36" Dia. of Ram, 24" Str., 22"x41" Betw. Columns

PRESS—STRAIGHT SIDE
No. 96F Toledo Double Crank, 12" Str 124" Bet. Uprights

PUNCH—BEAM
Kling Beam Punch & Cop. Mch., Arr. for M.D. Cap. to cope or notch 6" to 24" I-beams. Eqp. to punch 6 ¾" holes in ½" plate; 4hr. 8" chan or I-beams

PUNCH—MULTIPLE
HILLES & J. No 7, 98" Betw. Hous., 18" Thr., M.D., Cap. to punch 40 13/16" holes thru ½" plate. Equipment Thomas Spac. Table 22'6" long

PUNCH & SHEAR COMBINATIONS
No. 6 Beatty Dble. End, M.D. 16" Thr. Cap.Punch1" thru1"
No. 14 Wil. & W. Sgle. End, M. D. Lysholm Table Cap. Punch 1¼"x1" Throat 48"
Hil. & J. Punch, Sgl. End, M.D. Thr. 60" Cap. Punch 2" thru 1¼" with Lysholm Table
Type G Clev. Sgle. End, Arr. for M.D. 12" Throat. Cap. Punch 2" thru 1".

ROLLING MILLS
9" Belgian Bar Mill, Consisting of two 3 high roughing stands 12"x54"; finishing stand 2 stands 2 high 9" x 13", 3 stands 3 high 9"x30"
10"x9" Acme Four Stand 2 High
10½"x12" UE&F Sgl. St. 2 Hi.
14"x42" Gar. Sgl. Stand 2 Hi.
16"x20" Wat. F. Sgl. Std. 2 Hi.
22"x28" Univ. 3 High Mill complete install. incl. motor
19" Morgan 8 Stand Contin. Sheet Bar and Skelp Mill with 3 Stands of Vertical Rolls
24" Mackintosh Merch. Bar Mill, One 3-High Stands. One 2-High Bull Head Stand
30" Morgan 3 High Bill. Mill
44" Bloom. Mill. Consist. Pinion Stand, Rol .Tbl & Catch T.

SAW No. 4 Ryerson H. Sp. Fric. Hyd. Feed Mec. Complete with 3 H.P. Motor

SHEAR—ALLIGATOR
No. 2 Doelger & K., Arr. for B. M.D. Cap' 3" Rd., 2-1"Sq.

SHEARS—ANGLE
4"x4"x½" L. & A. Dbl. Angle Shear Arr. motor drive
6"x6"x½" Hilles & J. No. 2 Dbl. Angle Shear, Arr. M.D.
8"x8"x1" L. & A. Size C Dbl. Angle Shear, Motor Driven

SHEARS—BAR
No. 3 Hilles & Jones Guill. Type Arr. for M.D. Cap. Shear 3" Round, 2-1" Square, 10"x1¼" Flats, 6"x6"x¾" Angles
No. 10 Buffalo Armor Plate Belt or M.D. Cap. shear 3-¾" Rounds, 3½" Squares, 8"x1¼" Flats, 8"x8"x1" Angles

SHEAR—GATE
12' Beatty Mche. Mfg. Co. M.D. Cap. ½" Plate

SHEAR—ROTARY
No. 40A Quickwork Rot. Shear Arr. M.D. Cap. ½" Plate. Comp. with Circle Cut. Attach

SHEAR—ROTARY FLYING
United Engr. & Fdry. Co.,MD 1" Rds. up to 2"x½" Flats

SHEARS—SQUARING
96" Bliss No. 465, M.D. ½" Pl
12' Bertsch, Ar.M.D., Ca.3/16"

STRAIGHTENER
½" Hallden No. 2 Strtng. & Cut off Mch., Arr. M.D. 12' Cut-of
No. 0 Medart, Arr. for M.D Timken Equipped. Capacity ¼" to 1¼" dia. any length
No. 2 Sutton-Ab. Strtnr, M.D. Cap. Solid Bars 1¼" to 3½" Dia. Tubes, 1¼" to 4-½" O.D ¾", 3/16", ¼" ½" Shuster Rot Str.tng. & Cut-off Mchs.

TESTING MACHINE
200,000 lbs. Olsen Universal Screw Rot. Nut Type, M.D.

WIRE DRAWING MACHINES
Waterb. F. 7-Die Tandem Cap ¼" to No. 11 B & S Ga.
Vaughn Motobloc, No. 12-22 Arr. M.D. draw stock to 1 1/16" Dia. or fin.. wire 1"D

Entire Surplus Manufacturing Equipment Inventories Purchased. Appraisals. Liquidations. Consulting Engineering Service. Bona Fide Auctions arranged.

EQUIPMENT AVAILABLE for practically any type of manufacturing requirement

RITTERBUSH & COMPANY, INC.

NEW YORK 30 CHURCH ST. PH. CORTLAND 7-3437-3438
PITTSBURGH PARK BUILDING PH. ATLANTIC 1208
CABLE ADDRESS: RITTERBUSH, NEW YORK

ATTRACTIVE USED TOOLS

Milwaukee 1½B Universal Milling Machine, Dividing Head, Vertical Attach., etc.
12"x5' Hendey Lathe, Countershaft.
15"x6' Monarch Geared Head Lathe, M. D.
15"x8' Monarch Geared Head Lathe, M. D.
16"x10' Von Wyck Lathe, Countershaft.
22"x14' Davenport Quick Change Gear Lathe, Countershaft, 3 Chucks.
No. 3 Foster Turret Lathe, grd. bd., 2 H. P. motor, 10" wrenchless chuck, bar equipment.
Pratt & Whitney ⅝" Screw Machine; countersh.
4" Acme Bolt Cutter.
No. 36 Bliss Arch Press, 5" stroke, 1100 lb. flywheel.
Fifield Gasket Press.

C. B. BURNS MACHINERY COMPANY
541 W. Washington Boulevard, Chicago, Illinois

More FOR YOUR MONEY

GRINDERS

No. 70 Heald Internal Grinder
No. 4 Brown & Sharpe Univ. Grinder
No. 2 Brown & Sharpe Surface Grinder
Leblond Cutter Grinder
1½ Cincinnati Univ. Tool & Cutter (3)

MILLS

Bilton No. 50 Productomatic Miller (2)
Whitney Hand Mills (3)
3" Pratt & Whitney Automatic
Type A and B Cooley Edlund (4)

PRESSES

No. 6 Ferrel Press
35 Ton Henry & Wright Dieing Press
74½ and 75½ Bliss Trimming, back geared
No. 56 and No. 57 Toledo Press, Motor Driven

SHEARS AND ROLLS

51½" Shatz Bending Roll
Pettingell No. 14 Sheet Metal Rotary Shears

WELDERS

Taylor Electric or Auto. Spot Welders
25 Federal KVA Spotwelders
Standard-Arc Welders No. AW-74

DRILLS

4'-and 5' Radials box tables
Spdl. Avey, 12" overhang
Spdl. Leland & Gifford, with motors
4 Spdl. Leland & Gifford hydraulic cycle Kingsbury Drills (2)

AUTOMATICS

1-⅞" 8 Spdl. Cone with drill holder
2½" Cleveland Mod. B. sing. spdl.
No. 4 Brown & Sharpe with motor

MISCELLANEOUS

No. 3-D-5 Double End Rockford Boring Mach.
Anderson Power Scraping Machine
Schraner-Special Eight Station Crkshft Lapper
Oliver No. 36-C Wood Saw Cutoff Mach.
00 Turret Forming Machine
20 Ton Hanna Yoke Type Riveter
2 Spdl. Lipe Gear Chamfering Machine
No. 125 U. S. Meat Slicers (2)
¼" Schuster Wire Straightener and Cutoff
¾" Rickert Shafer Threader
Quickwork-36" Sheet Metal Bumping Hammer
Magee-Type No. 5-23 Sheet Metal Edger (2)
Detroit Power Magazine Feed Auto. Screw Driver
Hubbell-¾" Horizontal Tapper
Emery Stand (1)
Gisholt 18" Vertical Static Balancer

LATHES

Walcott, motor driven with motor
Hendey, motor drive with equipment
16x8 Reed Prentice, D. C. Lathe
No. 3 Gardner D. C. Motor Driven Polisher
No. 2A Warner & Swasey Turret Lathe

LAFAYETTE MACHINERY CORPORATION
6320 East Lafayette Ave., Detroit, Michigan

BORING MILLS, Horizontal

3½" Bar P & H No. 12 Floor
4" bar Gisholt, knee, M.D.
5" bar Betts, Knee Type
8" bar Beaman Smith, Floor

BORING MILLS, Vertical

10'-16' Niles Ext. Type M.D.
82" Pond, Heavy Duty
72" Colburn, P.R.T. New.
72" Pond, A.C., P.R.T., M.D.
60" Betts, M.D.
48" Gisholt, P.R.T., MD.
44" Putnam, P.R.T., M.D.
44" Bullard, Maxi-Mill P.R.T.
42" Bullard, P.R.T., M.D.
30" Colburn, 1 Turret Head..
24" Bullard Rapid Pro.

DRILLS, Radial

6' Mueller, Gear box, M.D.
6' & 3' Cinci. Bickfords
21", 24", 26" Cinci. Bick.
3' American, Sensitive.
3' Amer. Tri. Pur. Mo-on-arm.
3' - 6' Amer. Tri. Grd.
3' Amer.; motor on arm; H.S.
4 Spindle No. 2B Edlund.
4 Spindle Kokomo, No. 3 M.T.
No. 22½ Foote Burt.
26" Barnes Camel Back (5).

GRINDERS

8"x54" Fitchburg Pl., m.d.
10"x52" Landis Plain.
16"x50" Norton Self Cont.
No. 6 Bryant Chucking
16"x80" Cinci. Cyl. M.D.
18" Besly No. 26 Disc.
24" Besly Disc M.D.
18" Badger No. 220 Disc.
20"x96" Landis
No. 11 Landis Tool & Cutter.
No. 33 Abrasive Surface.
No. 55, 60 and 65 Heald Cyl.
Heim, Centerless.

LATHES

12"x6' So. Bend L.C.G. Cone.
14"x6' Cisco t.a., draw-in.
14"x6' Monarch, q.c.g., cone.
16"x6' So. Bend, L.C.G. Cone.
16"x8' Lodge & S., M.D.
16"x8' Simplex Q.C.G., Cone Pan
16"x8' Prentice, Grd. Hd.
16"x8' Hend. Yoke Hd., Cone.
16"x10' Mona'h L.C.G. Cone.
16"/18½"x10' American Grd. Hd. M.D.
18"x8' Amer. Grd. Hd. (2)
18"x8' Walcott Q.C.G., Cone
18"x8' Barnes L.C.G. Cone.
18"x8' Lodge & S. Cone.

LATHES (Continued)

18"x10' Lodge & S., M.D.
19"x8' LeBlond, Cone.
20"x10' Greaves Klusman.
20"x12' Greaves K., T.A.
20"x12' New Haven, T.A.
22/24"x8' Lodge & S., cone.
24"x10' American Cone
24"x19' American L. C. G.
24"x14' L & S T.A., Cone
26"x10' Pond, Q.C.G., Cone.
28"x12' Boye & Emmes.
28"/50"x10' Ran-Larmon Gap
30"x13½' N.B.P. Grd.Hd.,M.D.
30"x25' Pond L.C.G. Cone.
32"x17' Fifield, triple grd.
36"x14' Pond, Grd. Hd. M.D.
36"x15' Putnam Grd.Hd.,M.D.
36"x20' Springfield, M.D.
36"x22' Bridgeford, M.D.
36"x24' Bridgeford, M.D.
42"x20' L. & S. Cone, Q.C.G.
42"x30' Johnson Grd.Hd.M.D.
42"x40' N.B.P. Grd. Hd.
48"x36' Fified, m.d.
60"x25' Gleason hvy. duty.

MILLERS

No.. 2 Hendey Univ. Cone,MD.
No. 3 B. & S. Cone, Univ.
No. 5C' B. & S. Vert., S.P.D.
No. 6 Becker Vertical.
Model C Becker Vert. S.P.D.
Model CS Becker Continuous.
No. 6 Jackson Die Sinkers (3)
No. 4 Cinci. Pl. Cone.
No. 4 Cinci. Univ., Cone
No. 4 LeBlond Pl. Cone M.D.
No. 3 Kempsmith Pl. Cone.
No. 2 Cinci. Pl. Cone M.D.
No. 2 Knight Vertical
18" Cinci. Duplex 24" & 36" Sundstrand Rigidmills (2).
24"x24"x12' Ingersoll Adj. Rail Planer Type M.D.
28" Cinci. Semi. Auto.

PLANERS

48"x48"x12' D&H Openside.
48"x48"x18' D. & H. Closed Housing, 4 heads, Rev. M.D.
Box Table, New (3).
48" x 48 x 10' Gray, 2 Hds.,
48"x36"x10' Gray, 2 Hds.
36"x36"x20' Chandler 4 Hd.
30"x30"x9' Powell, 2 Hds.
24"x30"x6' Cinci., 2 Hds.
36" Newton Rotary, M.D.
30"x30"x10' D. & H. Openside.
30"x30"x8' Powell 2 hds.
27"x27"x6' W. & P., 1 Hd.
24"x8' Gray; 24"x7' Niles.
24" Lynd Farquhar Openside.

TURRET LATHES

3¼"x36" Cinci. Acme, Grd. Hd.
3¼"x36" J & L Steel Head.

TURRET LATHES (Continued)

No. 5 Foster, 1-13/16" bar.
No. 6 Foster, 2-⅛" bar.
Nos. 9 & 2 Bardons & Oliver
21" Gish. 3¾" H.S., 2 cone
24" Gish. 6¼ H.S., 2 Cone M.D.
28" Gisholt M.D.
2¼"x24" & 3"x36" J. & L.
No. 2A Warner & Swasey Univ.
No. 4 W. & S. Screw (2).
No. 4 W. & S. Univ. Cone M.D. (2).
No. 1A Cinci. Acme Univ.

MISCELLANEOUS

Automatic, 2¼" Gridley, 1 Sp.
Automatic 2¼" Gridley 4 spin.
Billet Breaking Mach., Ajax.
Bolt Threader, 1¼" Landis.
Bolt Threader, 2" Landis.
Brake, 8'6"x⅛" Chicago Press.
Broach, No. 2 Lapointe Belt.
Chucking, Nos. 34 & 23 N. B.
Die Sinkers, No. 6 Jackson (3).
Flanger, ⅛" McCabe Pneu.
Gear Cutter, 110" Newton Spur
Gear Cutter, No. 13 B. & S.
Gear Planer, 24" Gleason.
Gear Hobber, 6" Pfauter.
Header, 1¼" Acme Rivet.
Header, 2" Acme, Steel.
Keystrs., No. 1 Bak., No. 1 Dav.
Keyseat., Nos. 2, 3 & 4 M&M
Nibbler, No. 3 Gray ⅛", 36".
Pipe Mach. 4" Landis, M.D.
Pipe Machine, 8" Williams.
Pipe Machine, 12" Saunders.
Pipe Mach., 12" Curtis & C.
Pipe Mach., 2" Bignall Keeler.
Press, No.8½ Z & H Percussion
Press, No. 61 Spec. V & O.
Punch & Shear No. 47 PBC B.
Punch 54" H & J No. 2 D.E.
Punch, 36" Whit. ¼"x½".
Rolls, 8'x½" H&J No. 2.
Saw, No. 3 Ryerson Frict. D.C.
Saw, 9"x9" Peer. Hack, M/D.
Saw, 6" Avey Milband.
Saw, 6" Gorton No. 2B Inter.
Saw, 12"x15" Racine M/D.
Saw, 6" Peerless Univ. M.D.
Shaper, 16" American, Cone.
Shaper, 24" Gould & Eberhardt
Shapers, 24" & 20" Queen City M.D.
Shaper, 16" Ohio, M/D.
Shaving Mach. P. & W. Vert.
Shear, 8'x¼" H.&J. No. 2 12" gap.
Shear, 30" Cleveland, No. X.
Shear, 156"x¼" United, 36" g. 126"x¼" Amer., 22" Gap.
Slotter 15"-18" Dill.

BENNETT-RAFKIN MACHINE TOOL CO., Inc.

Offices: 30 CHURCH ST., NEW YORK CITY

3000 MACHINES IN OUR WAREHOUSES

BORING MILLS
Barrett No. 2 cyl., 5" bar.
Bullard 24" Rapid Production

DRILLS
P. & W. Nos. 11, 12, 13 Mult.
American 2' Radial
Morris 4' and 5' Radials.
Prentice 6' Radial.
Allen 3, 4, & 6 sp. B.B.
Henry & Wright 4 sp. and 6 sp.
Avey 4 spindle No. 2.
Upright Drills—many makes and sizes.

GRINDERS
B. & S. Nos. 1, 2, 3, Univ.
Bryant Nos. 6, 10A, 18A, S-A. 2 Sp. Hole, No. 40 Chuck.
Disc Grind.—All makes & siz.
Nort., 6x32", 10x36", 14x50".

LATHES
Hendey Lathes—most sizes.
Pittsburgh 32"x24', q.c.g.

MILLERS
Kempsmith No. 3 Universal.
Brown & Sharpe No. 2A Univ.
Cincinnati No. 3S Univ., M.D.
Brown & Sharpe No. 3 Universal
Van Norman Nos. 2, 20 Univ.
Hendey No. 1B Universal.
Becker No. 2A Vert., arr. m.d.
Becker No. 6 Vert., cone drive.
Lincoln Millers of all kinds.
P.&W. 6"x14", Thread Millers.
Milwaukee Cam Millers.

PRESSES
Bliss No. 18, 19 & 20 O.B.I.
V. & O. No. 12, 14 D.A.C. In.
Wat.-F. No. 6 D.A. Pillar Cam.
Stoll No. 67, s.s.
Ferracute No. 105 D.A.
Terkelsen D-1 150 t. M. Spring.
Stand. No. 4-R S.S. Reducing.
W-F Long. Stroke for shells.
Ferracute No. PG-P4.
Bliss No. 16, 4" str., Overh.
W-F Type for cartridges (20).

SCREW MACHINES
Grid. 9/16", ⅞", 1¼" Mod. G.
Clev. ⅜", ½", ⅝", ⅞", 2", 2¼", 2¾", 4¼" & 5½" Auto.
B.&S. Auto.—most sizes (we are specialists).
New Brit. 1x5", 1⅝x7" A.
Cone 1", 1¼", 1½" Automatic.
Hand Screw M. of all makes & sizes: W. & S., Foster, B.&S.
Potter & Johnston Nos. 5A, 6A Chuckers.
J. & L. 3 x 36 Steel Head.

MISCELLANEOUS
Broaches, LaPointe 1-2-3-4.
Burnishing Barrels, Abbott.
Hammers-Board Drop.
Hammer — Standard 800 lb. automatic.
Headers, many sizes & makes.
Measuring Machines, P.&W. 12", 24" & 48".
Planer—Detrick & Harvey 36" x 36" x 12' Openside.
Planer—Shaper—Lynd Farquhar 26" Openside.
Rolling Mill, Robertson 12"x12" for non-ferrous metal.
Shapers—from 7" to 32".
Shear—Niagara 10-14 Ga.
Straighteners—Shuster, for wire.
Swagers—12 in stock.
Tapper—Threadnut No. 2 auto. nut.
Wire Formers, Nilson&Baird.

BOTWINIK BROTHERS, INC.
37-127 WATER ST. NEW HAVEN, CONN.

NEED GOOD TOOLS? — SEE US FIRST

D-31 FOX MULTIPLE DRILL, RECT. HEAD, 16"x31½" spindle centers. Bored for 36 spindles. Has ten 1¼ No. 2 Taper spindles. Power feed to head.

AUTOMATICS, Several Model A Clevelands, from ⅝" to 3¾" bar capacity.

BOLT CUTTER, 1¼" Acme single, class A: 2" Landis.

DIES and EQUIPMENT to make square cans, pt., qt. & Gal. size.

DRILLS, 36" Cincinnati back geared, sliding head, tapping attachment; No. 2 Colburn Manufacturing; 36" Snyder, back geared; No. 12 Minster H. D.; 24" Barnes All Geared Self Oiling B.D.

GRINDERS, 12"x72" Landis M.D.; No. 78 W. & M. Surf. M.D.

HAND SCREW MACHINE, Wells ⅞" capacity.

LATHES, 38"x14' Fifield — Cheap; 16"x8' Sidney, double back geared, quick change; 14x6 Carroll Jamison; 18"x8' Lodge & Shipley, Geared Head.

MILLERS, No. 6 Becker Vert. with ball bearing countershaft; No. 3H LeBlond heavy duty pl.

MONITOR LATHE, 16' Dreses, universal, with chasing bar.

PLANERS, 30"x30x8' Cincinnati, two heads on rail; 36"x15' Betts, 2 heads.

PRESSES, No. 1 Bliss Cam Drawing Press, (2) No. 3 Minster.

SCREW MACHINES, No. 4 Milholland; No. 4 Foster cone head; 1½"x9"; Acme cone head.

SHAPER, 28" Kelly B. G. Single pulley drive, 10 H. P. A. C. Motor.

TURRET LATHES, 21" Libby and 21" Gisholt, (3).

Many other tools—exceptional "buys"—write for full details.

A. D. White Mchy. Co., 108 N. Jefferson St., Chicago, Ill.

• UNUSUAL TOOLS •

SOLD WITH AN ABSOLUTE GUARANTEE OF SATISFACTION

Automatics
2" Cleveland Model A., s.s. (3).
Cleveland Model A, 1¼" (5)
Cleveland Model B, 1¼" (3)
Cleveland Model C, 1¼" (5)
Cleveland Model C, 2" (2)
No. 34 New Britain Chucker.
New Britain 6 spin., 1" cap. M.D., cutoff (2)
Brown & Sharpe, O, OO, OG, OOG, No. 2 (30).

Drills
2 spdle. Henry & Wright, No. 3 M.T., P.F.
2, 3, 4 spdl. H & W., Allen, Lel. G., Avey (33)
3, 4 & 6 spdl. All. Hi-Sp., P.F., Tap. At., l.t.
4 spin. No. 2 Colburns, No. 3 MT, (2)
4 spdl. Cincin. Bick., dir., motor dr.
3' Amer. Hi. Sp. Rad., motor on arm.
Moline Hole Hog, various sizes (5).
Fox Mult. spdl. with Tapp. att. (4).
Pratt & Whitney double end, m.d. & m.

Gear Equipment
No. 36 S.T. G. & E., Auto., 4 s. Gr. R., m.d.

Grinders
Arter No. 132 Drum Type, m.d. (2).
Norton Model B Tur. type, m.d. (2).
No. 126 Gardner db. spdl. op. m.d., hyd.fd.
53" Besley Vert. Disc, m.d. & m.
Nos. 6, 12A & 20 Bryant (12).
12" and 16" x 36" Cinc. Pl. Cyl. (2).
Oakley Tool & Cutter (2).
16"x42" Landis Crank M.D. like new.

Lathes
21" Gisholt Turret
Fay Automatics, 14" standard (7).
Gisholt Simplimatics, m.d. (2).
No. 3 Foster Gd. Hd., Turret.
No. 4 AC LeBlonde Crank Shaft M.D.
17"x8' LeBlond Gd. Hd., mtr. in cabinet leg, ta. chuck, 4 yrs. old
Nos. 5A, 6A P & J Auto., m.d. (12).
No. 7A Potter & Johnson Automatic
No. 2, 4, 6 Warner & Swasey Turret (8).

Mills
No 3 Kent Owens, Power feed, m.d.&m.
Nos. 1, 2 & 3 Craftsman Rot. Prod.
18" Cincinnati Semi Auto., sgl. & dup. hds.
No. 21 Brown & Sh., Prod. s.p.d.
No. 12 P & H Boring, floor type, 7" dia. quill, m.d. 5¾" dia. spindle nose.

Planers
24"x24"x6' Gray Dble. Hsg., b.m.d.
36"x60"x14' American, widened to 60".
60"x60"x12' Niles-Bement-P., box table.

Presses
2-ton Flexible, m.d.
10, 25, 50 ton Henry & Wright with dbl. rl. fds.
25 ton Metalwood Hyd., 4-post.
No. 2½ V & O, OBI Dial feed, M.D.
No. 3 Consolidated, md. & m., dial feed.
No. 5A Toledo, O.B.I., flywheel type.
No. 6½ Toledo, O.B.I., G.M.D., B.G.
No. 6-I Cleve. O.B.I., G.M.D., (4); No. HG HG Cleve., (3). Eqiv. No. 6—O.B.I.
No. 4 & 5 Verson OBI, PL., M.D.
No. 5 Verson OBI, BG., M.D.
No. 5 Canco, 8" str., S.S., bk. grd.,m.d.&m.
Nos. 56 and 57 Toledo S.S., sgle. cr.
No. 62 Toledo, S.S., Bk., Grd., m.d.
No. 77½ Bliss S.S., S.C., Tie rod.
No. 78½ Bliss S.S., S.C., tie rod (3).
No. 24 Toledo, cam. draw., m.d. & m.
No. 4A Bliss swinging adj. table, m.d. & m.
150 ton Ferracute knuckle joint.
No. 14 Toledo Horning, grd. mtr. dr.
P-2, P-3, P-4 Ferra., solid back, q.m.d. (12)
DG-53 Fer. S.S., S.C., B.G., G.M.D.
Bliss Consolidated No. 3, 4, 5, m.d.

Shapers
16" Ohio (2)
24" Stockbridge.

Shears
52", 14 ga. Niagara, b.d.
8', ¼" Toledo, b.d.
10' ⅜" Pexto Gap Frame Lathe Type, m.d.&m.

Upsetters
1" National, Steel Bed.
1¼" Acme, steel bed, m.d.

Welders
175 KVA Thomson Projection (2).
Federal, 125 KVA, M.D.
200 KW Federal Projection Spot.
150 KVA Thompson Butt Welder.
Spot, Taylor Winfield Automatic, 20-27 KVA (6), motor driven, late type.
Taylor Winfield, National, Federal m.d. Butt (12)
Taylor Winfield 4 way Flash Welder m.d.
Taylor Winfield, Federal Thomson Spot (34).
Taylor Winfield Gun Type, Portable.

Miscellaneous
Balancer, 18" Gisholt Static, Vert.
Boltcut., 2 sp., ¾" cap., Landis, ld. scr. att.
Bolt Threader, 2 spindle No. 3 Manville
Broach, No. 4 Lapointe.
Broach, V-18 American.
Chip Separator, McKenzie, M.D.
Die Sinker, No. 2 Pratt & Whitney
Elec. Mule, Elwell Parker.
Pipe Threader, No. 3 Wil., m.d.&m., 6" cap.
Polishers, U.S. Electrical Tool, m.d. in base, 4-brg., h.d. type (16).
Punch, Mod. ID C. Sgl. End, m.d., cap. 2 holes, 1 thr. 1¼", 36" thr. flang. ram, l.t.
Rivet Heaters, Berwick (4).
Slotter, 20" Sellers, b.m.d.
18" Gisholt Static Balancer, arr. m.d., with 4-speed head.
Threader, No. 3 Manville, Dbl. spin., Auto Hopper Feeds.
Wire straightener
¾" Shuster, MDM.

AND A COMPLETE STOCK OF FINE UP-TO-DATE EQUIPMENT

HARVEY GOLDMAN AND CO.

10571 GRATIOT AVE. DETROIT, MICH.

"READY TO SHIP"

AMERICAN 24"x18' Screw Cutting Lathe, Cone Pulley, Double Back Geared.
CINCINNATI No. 2 Universal and Plain Millers, countershaft.
GARVIN No. 3 Duplex Millers, Cone Drive.
WARNER & SWASEY No. 4, No. 2 Turret Lathes, Wire Feed, Cone Drive.
FITCHBURG Low Swing Lathes, geared head, S. P. D., 5"x5' centers.
PRATT & WHITNEY No. 13 Multiple Spindle Drill Press, rectangular head.
ALLEN High Speed Sensitive Drills 2, 3, and 4 Spindle.
CINCINNATI-BICKFORD Radial Drills, 3½'.
NATCO No. 14 Multiple Spindle Drill, 22 spindles, R. A. Head, 18"x26" Table 22"x30", S. P. Drive. Serial 11,200.
BROWN & SHARPE Hand Screw Machines, No. 2 c./s. drive, Nos. 0 & 1 Motor Drive.
BROWN & SHARPE No. 2 Surface Grinders.
BETTS 18" Crank Slotter, countershaft drive. Will slot center of 85" diameter.
GOULD & EBERHARDT Crank Shapers, Cone Drive 24"—16".
CLEVELAND 2¾" Automatic Model A.
GRIDLEY 1¾" 4 Spindle Automatic Model F, countershaft drive.
LOY & NAWRATH 10 ft. Power Squaring Shear, 3/16 capacity, m. d.
DREIS & KRUMP 6 ft. Box and Pan Brake, Motor Drive, 10 gage, 8" fingers.
NIAGARA 7-B Geared Inclinable Power Press, 5" stroke.

Other just as desirable tools in our large stock. Send for catalog.

MORRIS MACHINERY COMPANY, INC.
97 Chestnut Street . . . . . Newark, N. J.

IF WHAT YOU WANT ISN'T HERE *Send Us Your Inquiry*

BRAKES:
No. 183 Chicago 8 ft. 12-ga., pwr.

DRILLS:
Radial, 3 ft. Fosdick.
Natco Type K 20-spdl.
Rail. Foote-Burt Nos. 2 & 4, 4 spdl.
Prentice, 4-spindle.
Allen BB 5-spindle.
Allen BB Type B sgl. spdl.
Demco DAH BB, MD.
36" Cincinnati BG PF SL.
25" Bickford, G. & E.; Skd. Hd., P. F.
20" & 24" Prentice BG.

GRINDERS:
Disc, No. 6—20 Besly.
Disc, No. 220 Badger & press.
Drill, New Yankee, D. E.
Internal, Madison; No. 65 Heald.
Surface, No. 210 Heald 8".
Surface, LaSalle.

HAMMERS:
50-lb. Little Giant MD.
40-lb. Bradley Helve.

LATHES:
24"x14' Bradford, P. C. G.
18"x8½' Rahn & Mayer.
18"x8' Lodge & Shipley MD.
15"x6' Flather, S. B. G.
14"x6' Lodge & Shipley.

LATHES—Turret:
16" Type A Gisholt, 6⅛" hole.
21" Type H, Gisholt, 3⅝" hole.
24" Type I Gisholt, 4⅛" hole.
24" Type I Gisholt, 4⅞" hole.

MILLERS:
No. 25 Becker-Brainard.
No. 3B Owen, DH, Vert. att.
Pratt & Whitney, 2" spline.

PRESSES:
Hydraulic, 42-ton Elmes.
OBI, Nos. 0, 2, 3 Loehbough-J.
O. B. I. No. 2 Sidney.
O. B. I., No. 30 Swaine.
Foot Press, No. 4 Swaine.
Arch Press, No. 40 Swaine.

PUNCHES & SHEARS:
Queen City DE, ½ in ½", M. D.
Rock River L, ½ in ½"; 24 thr.
Cleveland C, SE, ¾ in ¾", 26" thr.
No. L-10 Badger, DE, ½ in ½".
No. 14½ W-W., 25" thrt.; m. d.
No. 54 Beloit S. E., ¾" in ¾".

SHEARS:
Jig, GEM, 18 ga. cap., M.D.
Rotary Bevel, Lennox ¾".
Square, Stark 9'; 18 ga. cap.

THREADERS, Pipe & Bolt:
Murchey, ¾" dbl. head, bolt.
Pipe, 2" Oster M. D.

MISCELLANEOUS:
Bender, No. 15 Wallace.
Dbl. Seamers, Swain.
Compressor, H-B CCB, 14x9x8, 20 HP motor.
Groover, 30" Toledo.
Planer, 30"x30"x8' Pease.
Planer, 30"x30"x8' Wheeler.
Metal Band Saw, 14" Racine.
Rolls, 10' Pyramid, ½" cap.
Saw, cold, Higley 20".
Shaper, 20" Smith & Mills.

Brown Mchy. Co., 2333 N. Ninth St., St. Louis, Mo.

BUY WITH CONFIDENCE

BORING MACHINES

No. 2 Coffman, 3¾" bar, motor drive.
No. 2 Barrett, 5" bar, extension bed.

BORING MILLS

42" Gisholt
48" Gisholt.
48" Colburn.
52" Gisholt.
54" Colburn.
60" Colburn.
60" Gisholt, M.D.
72" Bickford.
72" King, motor drive.
72" Niles, Bement, Pond, M.D.
10' Niles.

DRILLS

No. 2 Colburn, 3, 4 Spindle.
No. 314 Baker Heavy Duty.
No. D-4 Colburn Heavy Duty.
No. 4—5 spdl. Foote-Burt rail.
No. 1, No. 3, No. 4 Baush Multiple.
3' Western Plain Radial.
4' Western, motor on column.
4' Carlton plain.
5' American triple purpose.
6' American Plain.
6' Western Plain Radial.
7', 8' Western heavy Radial.

GEAR CUTTERS

No. ½, No. 1 Pfauter Hobber.
No. 3, 4, 5, 6 Brown & Sharpe.
No. 2, No. 3 Pfauter Hobber.
No. 2—60" Goss Hobber.
Nos. 6, 61, 62, 624, 645 Fellows.
No. 6A—Cinn. Auto.
18" Gleason Bevel Generator, m.d.

GRINDERS

No. 2, 2½ Universal (Bath type).
No. 4 Landis Universal.
No. 70 Heald Internal.
No. 16-A Blanchard Auto. Vert. Surface.
No. 22-12" Heald Rotary Surface.
No. 25—Heald Surface.
16" x 32" Landis Crankshaft.

LATHES

16" x 8' Lodge & Shipley, Taper.
16" x 9' Chard.
18" x 8' Lodge & Shipley.
18" x 12' American, geared head.
20"x10' Lodge & Shipley Grd. Hd.
20"—40"x10' Rahn-Larmon, geared head, sliding bed gap.
20"x12' L. & S., Grd. Hd., M.D.
24"x16' Lodge & Shipley.
24"x18' American, Grd. Hd.
24"x20' L. & S., Grd. Hd. Taper.
24"x22' Lodge & Shipley, Taper.
27"x18' American, grd. Hd., Taper.
27"x18' Sidney, Taper

NORTON MOTOR DRIVEN GRINDERS

6"x18"	10"x72"	16"x50"
6"x32"	10"-15"gapx72"	16"x72"
10"x18"	10"x96"	18"x96"
10"x24"	10"x120"	18"-24"gapx96"
10"-15"gapx24"	14"x36"	21"x96"
10"x36"	14"x50"	21"x144"
10"x50"	14"x72"	23"x120"

LATHES—Continued

30"x12' L. & S., Grd. Hd.
30"x12' Lodge & Shipley, taper att.
36" x 21' American geared head.
36"x16' American, taper.
36"x24' Bradford, taper att.
40"x12' Fifield.
46"x30' Houston, Stanwood & Gamble, m d
60" New Haven turning & boring.

MILLERS

No. 2 Brown & Sharpe Plain.
No. 3 Kempsmith Plain.
No. 3 Kempsmith Univ. Maximiller.
No. 3 Cinn. Vertical.
No. 5-B, No. 6, No. C-2 Becker Vertical.
No. 3 Garvin Duplex Mfg.
No. 4 Hendey Mfg.
Type "B" Briggs Mfg.
No. 7-H Becker Mfg.
No. 8 Hendey Mfg.
No. 12 P. & W. Mfg.
24" Cinn. Duplex.
No. 33 Becker Brainard Mfg.
36"x36"x12' Newton Slab.
38"x44"x20' Ingersoll Slab.
72"x16"x14' Ingersoll Slab.

PLANERS

24"x24'x6' Rockford.
24"x24"x12' Gray.
36" x 30" x 10' Gorton.
36"x36"x8', 18' Cincinnati.
42"x42"x30' Niles-Bement-Pond, Rev. M.D.
44"x36"x12' Gray.
48"x48"x16' Niles-Bement-Pond.
72"x60"x16' American Widened Pattern.

PRESSES

No. 01, No. 1 V&O., O.B.I., M.D.
No. 1½ V.&O., O.B.I., M.D.
No. 20 Bliss, O.B.I., M.D.
No. CG—24 Ferracute O.B.I., Geared, M.D
No. 3; No. 5 V.&O., O.B.I., grd., M.D.
No. 58 Toledo Nosing presses

TURRET LATHES

No. 6 Warner & Swasey.
21"x8' LeBlond
3"x36" Jones & Lamson.
24" Warner & Swasey.
24" Steinle.
24" Gisholt.
No. 4-L Gisholt, cross sliding turret.
34" Gisholt, motor drive.

HILL-CLARKE MACHINERY CO.

645 W. WASHINGTON BOULEVARD, CHICAGO

GUARANTEED MACHINES— IMMEDIATE DELIVERY

42" King Vertical Boring Mill, Turret Head, 1 Paine Head on rail R P T
24" Bullard Vertical Boring Mill with 1 Side Head, 1 Head on rail
48"x48"x14' Patch Planer Direct, Variable Speed Motor Drive

AUTOMATIC SCREW MACHINES

	Model	Ser. No.	Driv.
Clevelands			
18—3¾"	A	34000	Plain
1 2½"	A	26300	Plain
1 2½" 18" feed	B	35000	M.D.
Brown & Sharpes			
No. 2G Full Auto.		3300	S.P.
No. 0 Full Auto.		4200	Plain
No. 00G Full Auto.		6800	S.P.
No. 00 Full Auto.		5988	Plain
Gridleys			
3—1¼" 4 spdl.	G	10000	M.D.
1—1¾" 4 spdl.	F	7900	S.P.

HAND SCREW MACHINES

No. 1 Foster, plain head Auto. Chuck
No. 3 Foster, plain head Auto. Chuck
14", 18", 21", 24", Gisholt Turret Lathes
2¼"x24" Greenlee Turret Lathe
18" Libby Turret Lathe M.D.

DRILLS

2, 4 spdl. Allen H.S. BB., B.F. ⅞" cap.
4 Spdl. Washburn H.S. BB., ⅞" cap.
1 Spdl. Lel-Gif. 14" swing, H.S. BB., ⅞"cap.
1 Spdl. Avey No. 2 M.T. H.S., BB., ⅞"cap.
1 Spdl. Demco H.S. BB., ⅞" cap.
3" American Radial H.S. Sensitive
No. 3 Barnes Horiz. Radial, 3" cap.

GRINDERS

No. 70 Heald Internal Ser. No. 2400, BD.
Webster & Perks, 6"x30" Cyl. self cont. MD.
Landis 10"x20" Cyl. plain BD.
No. 1 O.S. Walker Cutter grinder BD.
No. 3 Wilmarth & Marmon, wet surf. Gr.Ch.

LATHES

Rivett ⅞" Bench, Sc. mach. tur. & cut-off
So. Bend 9"x3', 2 chucks, B.D.
So. Bend 11"x5' Pl. Ch. chuck B.D.
Seneca Falls 11"x5' Q.C. chucks, collets,M.D.
So Bend 13"x5' Pl. Ch. chuck, B.D.
Mulliner 13"x5' Q.C. Tap. att. chuck, BD.
Hendey 18"x8' Q.C. tap. att. chucks, B.D.
Schumacher & Boye 18"x10' Q.C. tap. att.B.D.
Bradford 24"x10' Q.C. chk. rais. blk. to 30"

MILLERS

42" King Vertical Boring Mill, 2 heads
24" Bullard vertical Boring Mill, side head
No. 3 Kempsmith Univ. arbor, B.D.
No. 3 Kempsmith Plain arbor, B.D.
No. 2 Kempsmith plain
No. 25 Bilton Plain, div. head M.D.
No. 9 Kempsmith Plain arbor B.D.
Hand Millers, Chgo. Whitney, Pratt & Wright
No. 2 Knight Vertical Univ. with slotter,B.D.
8" Pratt & Whitney Prod. Mill

PRESSES

25 ton Henry-Wright, dieing, with feeds, B.D.
No. 15 Robinson, horn type, table, direct M.D.
No. 3 R. & K. O.B.I. 2½ str.

SHAPERS

24" Stockbridge B.G. Vise, M.D.
20" Smith & Mills B.G. Vise B.D.
20" American B.G. Vise B.D.
12" Chase, S.P.D. Vise

MISCELLANEOUS

36" Niagara Power Sq. Shear 14 gauge
G. & G. Rope Drop Hammer, 75 lb. cap.
Tapper Garvin No. 2, cap. ½" to ¾" B.D.
Hammers, High Speed, 3A and 5A
Keyseater No. 2 Mitts & Merrill, equipment
Band Saw 20", Porter Cable M.D.

SCOTT MACHINERY SALES, INC.

1811 Carroll Ave., Chicago, Illinois

LATHES

26/48'x14' McCabe.
24'x12' Boye & Emmes.
18'x12' Hendey.
18'x8' National.
18'x8' Greaves Klusman.
16'x8' Lodge & Shipley.
14'x8' Cisco.

DRILLS, RADIAL

4' Western.
4' Mueller.

MILLING MACHINES

No. 1 Brown & Sharpe Univ.
No. 1B Brown & S., Plain.

PIPE MACHINES

6" Oster.
12' Curtis & Curtis.

PLANERS

26' x 26' x 8' Fitchburg.
30'x30'x10' Pond.

SHAPERS

20" American.
20" Steptoe.
24" Gould & Eberhardt.

McBRIDE & McCLENNEN *Since 1919*

Trading As

DELTA EQUIPMENT CO.

148 N. Third St., Philadelphia, Pa.

HIGH GRADE TOOLS FOR QUICK DELIVERY

Lathes

14"x6' & 16"x6' LeBlond 3 S.C.D. D.B.G.
19"x8' Le Blond, Q.C., 3 S.C.D.
21"x10' LeBlond, 3 S.C.D. D. B. G.
25"x16' LeBlond, 3 S.C.D., D.B.G.
18"x8' American Grd. Hd. Lathe, S.P.D.
20"x8' American, 3 S.C.D. D.B.G.
20"x16' American, 3 S.C.D. D.B.G.
2-18"x8' Lodge & Shipley Grd. Hd. M.D.
18"x24' Lodge & Shipley Engine Lathe.
20"x10 &12' Lodge & Shipley Pat. Hd.A.C.M.D.
30"x16' Lodge & Shipley Cone Q.C.
30"x30' Lodge & Shipley, Q.C.
30"x16' American Geared Head, S.P.D.
30"x20' Amer. 12 speed Grd. Hd. S.P.D.
36"x14' New Haven Cone drive.
20"x10' Hendey Cone Q.C.

Planers and Shapers

24" Kelly Shaper, Cone drive.
24"x24"x6' Gray Planer.
36"x36"x14' Detrick & Harvey Openside
48"x48"x16' Pond Planer H.D. 4 Heads.
26" Whipp Openside Crank Planer, S.P.D.
16, 20, 24" G & E Shapers, cone drive.
16, 20, 24 and 28" Gould & E. Shapers, S.P.D.
20" Amer. Shaper, M. Mak. Tbl. & vise. S.P.D.
16" Ohio Crank Shaper, Cone drive.

Radial and Drill Presses

3½', 4', 5', 6' Amer. Triple Geared S.P.D.
4', 6' American Triple Purpose S.P.D.
6' American Trip. Purpose, M.D.
2-3' Mueller. S.P.D.
2½' Cincinnati Bick. S.P.D.
21", 24" Cinc. B. Upright Geared Feeds.
24" Barnes Upright B.D.

Gear Cutters

No. 1, 2, 3 Adams Farwell Gear Hobbers.
No. 12H Gould & Eberhardt S.P.D.
No. 18HM Gould & Eberhardt S.P.D.
No. 11 B & S spur and bevel Gear Cutter.
No. 3-26", 3-36", No. 4-36" B & S Gear Cutters.
30" Flather Gear Cutter.
Gleason Spiral Bevel Generators and finishers.
50" Rhenania Gear Hobbing machine, C.D.
No. 1 Cross Gear Tooth Rounder.

Millers

No. 3 Cincinnati Plain, 3 S.C.D.
No. 4 Cincinnati Hi.P. Cone 3 S.C.D.D.B.G.
No. 4 Cinc. H.P. Cone Univ. 3 S.C.D., D.B.G.
No. 2 Cincinnati Plain Cone.
No. 2 Kempsmith Univ. Vert. Hd.
No. 2 Kempsmith Cone, M.D.
No. 3 Kempsmith Universal Cone.
No. 2 Hendey Universal S.P.D.
No. 3 LeBlond Plain 3 S.C.D.

Grinders

New Schuchart & Schutte Hob Grinder (Barg).
No. 33 Abrasive Surface M.D.
No. 16 Brown & Sharpe Plain.
Diamond Face Grinder.
No. 1 Diamond Surface Grinder.
No. 50, 550, 60, 65, 70 Heald Internal.
No. 75 Heald Internal.
5"x18" Ott Plain Grinder.
6"x18" Landis Plain, Self Contained.
10"x36" Landis Plain, S.C.
12" Pratt & Whitney Plain Surface Grinder.
53" Besley Ball Bearing Vert. Spindle Disc.

Boring Mills

2½" Universal Boring Mill S.P.D.
42" Bullard rapid production, 2 heads.
48" Bullard Cone.
60" Gisholt, P.R.T.
No. 1 Barrett Horz. Mill.

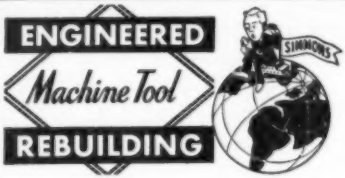
Turret Lathes

No. 1 Foster, Cone drive.
No. 7 Foster Universal Turret Lathe.
No. 4 & 6 W & S Plain Cone Drive.
24" Gisholt, C.D.
25" Le Blond Full Turret Lathe.

Miscellaneous

2½" Landis Bolt Cutter.
No. 4 & 5 Mitts & Merrill Keyseaters.
Model W Cleveland Pch. & Shr. 60" thrt., M.D.
1" Ryerson Lennox Rotary Bevel Shear M.D.
8'x¼" Chicago Bending Brake.
6'x3/16" Chicago Bending Brake.
5'x10 gauge V.K.V. Press Brake.
No. 92D Toledo D.C. Press.
No. 4A High Speed Riveter New.
2—No. 35 Niagara Presses New.
No. 36 Niagara Press New.
10'x3/16" Sholl Power Squaring Shear M.D.
6"x6" Peerless Shaping Saw.
13"x16" Peerless Power Hack Saw.
8'x3/16" Capt. Toledo Power Squaring Shear, Gap.
Pels Armor Plate Shear.
35 K. W. Federal Spot Welder.

CINCINNATI MACHINERY & SUPPLY CO.
217 EAST SECOND STREET **CINCINNATI, OHIO**



100" Poole HD Vertical Boring Mill, M/D.
8" Bar Beaman-S. Floor Type Hor. Bor. Mill.
10' Niles-B.-P. HD Vert. Bor. Mill, M/D.
3½' Dresses H. D. Plain Radial Drill.
5' Cincinnati-Bick. Full Univ. Radial Drill.
6' Bickford Plain Radial Drill.
No. 70 Heald Internal Grinder.
27"x22' Bridgeford HD Mfg. Type Lathe.
30"x12' N-B-P Geared Hd. Lathe, M/D.
42"x15' N-B-P HD Lathe, Belt Drive.
32"x21' Niles Heavy Duty Forge Lathes.
54"x30' Pittsburgh Heavy Duty G.H. Lathe.
30"x12' Bridgeford Plain Turning Lathe.
No. 3-CS Becker Continuous Vert. Miller.
66"x60"x15' Ingersoll Planer Type Mil., M/D.
No. 14 Cochrane & Bly Miller and Shaper.
60"x60"x24' N-B-P Pl., Dir. M/D 4 Hds
48" N-B-P Rotary Planer, Motor Drive.
No. 3 Hilles-J. 25' Hvy. Plate Planer, M/D.
26" Cin. Shaper, Dbl. Head Type "B" M/D.
32" Morton HD Draw-Cut Shaper.
48" N-B-P Crank Slotter, M/D.
No. 4 W-S Turret Screw Mch. Friction Hd.
No. 6 W-S Screw Mch. Friction Hd. M/D.
No. 2 Baker Keyseater.
No. 3½ Baker Keyseater.
No. 4 Mitts & Merrill Grant Keyseater.
2" Landis Pipe Cutting & Threading Mchs.
6" Landis Pipe Threading & Cutting Mchs.

SIMMONS MACHINE TOOL CORP.
1725 Broadway, Albany, N. Y. Singer Bldg., New York City

HIGH GRADE MACHINE TOOLS

14" PRATT & WHITNEY VERTICAL SURFACE GRINDER, hydraulic feed, m. d., with 36" mag. chuck; pract. new.

No. 31 LUCAS HORIZONTAL BORING MILL, 3" bar, single pulley drive.

No. 3 CINC. VERT. MILLER, single pulley drive, slotted nose.

No. 2A WARNER & SWASEY GEARED HEAD TURRET LATHE, hollow hexagon turret, arranged for chucking. Serial over 200,000.

No. 1A WARNER & SWASEY GEARED HEAD TURRET LATHE, hollow hexagon turret, arranged for chucking. Serial over 280,000.

No. 3 BARBER COLMAN GEAR HOBBER, serial 541; with change gears.

HUNDREDS OF OTHER MACHINE TOOLS IN STOCK.

Indianapolis Machinery & Supply Co., Inc.
1959-69 SOUTH MERIDIAN STREET, INDIANAPOLIS, INDIANA

Extra!

INTERSTATE'S
Latest Catalog No. 404

Describes over 2000 machines in stock—
READY FOR IMMEDIATE SHIPMENT.

SEND FOR YOUR FREE COPY TODAY

BORING MILLS

10' Pond, vert. 96" table; Betts
10 Ft. 16" Extension type;
72" Colburn rapid traverse vert.
42" Bullard, New Era, Side Hd.
24" Bullard Rapid Prod. Side H.
42" Gisholt Vertical
52" Bausch Vert. 2 heads
84" Niles Vert. 2 heads
12" Cyl. Double End;

GRINDERS

No. 16 Blanchard" surf 36" chk.
No. 25-A Heald R. Sur., 24" ck;
Heald Rot. Sur., 16" Mag chuck;
No. 3, 4 G. & L. Tool & Cutter;
No. 25 Landis Cyl. 24"x144";
No. 96 Norton, surf., 72", 15
H. P motor

IRONWORKERS, UNIVERSAL

Pels No. 20, 6"x6x½"; 4x4½"
Smith No. 91-16, Capacity 6"x
6"x½"; with notching attach.
Smith No. 91-13, Capacity 4"x
4"x½"; with notching attach.

LATHES

Am. Grd. Hd. 18x8; 24x16;
16x8 Bradford; 16x6 P&W;
25x10 Rr.; 30x18, 36x30
L&S L&S 18"x10' Grd. Hd.
M.D. 30' Pit Lathe, 156"
face plate

LATHES — TURRET

No. 1B Foster, bar feed
No. 4 Warner & S. Univ. M.D.
No. 2-A, No. 3-A Warner & S.

MILLERS

Univ. No. 3 Kemp, No. 3A B&S
Plain No. 3-B Milw. 2B B&S
No. 4 Cin. Vertical No. 3 Ryerson-Con. No. 2 B&S; Becker
Nos. 2, 4, 4B, 5B, 6

PLANERS

48"x48"x12' Belmar, 4 heads
20' Niles; 26"x8' Cleve. Opens.

"SPECIAL"

Keller Type GG-1210 Automatic Tool Room Machine Horizontal & Vert. With Precision Locating At., etc.

ROLLS

Angle, 4x4½ G&H, M.D.; Nia.
1¼x1¾x¼; Exc. 2½2x¼
Wickes, Pyramid Type, with mtr.,
Drop End Housing, sizes—18'
x1"; 12'x1¼"; 7'x¾".
8' Beloit 1"; 20' Cor. Cap. 1½"
6' Bertsch 4¾"
12'x¾" Kling with AC Motor

RADIAL DRILLS

American 2½'; 4'; 6'; West. 6';
5' Fosdick Econmax, Mt. on arm

SCREW MACHINES

Natl. Acme Gridley Automatics 3"&4", 4 spindle, with motors

SHAPERS

G.&E., Invincible, 32", 28",24"
Cin. 20", 16"; 24" Am. & Mil.

SHEARS

Throatless, Marsh. No. 10P, No.
112M; ¼ & ⅜"
13' ⅜" and 10' ⅜" United
Cincinnati, Chicago Steel,Bertsch,
Niagara, 10 Ft. 3/16".
Niagara 10' 1/4" 18" gap.
10' 10 ga. Bliss, 8"½" Beatty
10' 10 ga. Streine, 5' 3/16 Nia.
5' ¾" Plate Shear, 12" gap,M.D.
12' ½" Beatty Gap

LARGE PRESSES

PRESSES, Toggle

Bliss Nos. 5, 5A, 3½B, 3½, 1½; Toledo Nos. 28B½, 16B½" 164; No. 99 Stoll; No. 7 Z & H.

PRESSES, Hydraulic

400 ton; 100 & 200 ton Litchf.

PRESSES, HORN

No. 10—6 Minster M.D.; Nia.
Nos. 15, 116.
Bliss Nos. 39, 40, 21, 25½ B.G.
Toledo Nos. 14, 42, 41A, 43P

PRESSES, Straight Side

No. 78½, No. 77½ Bliss
No. 59 Toledo 18" stroke
No. 305 Bliss—6" st. (3)
No. 66 Consolidated, 8" stroke

PRESSES, Double Crank

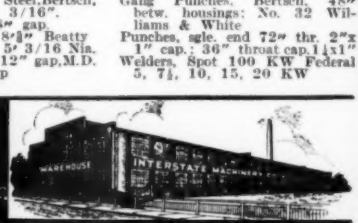
No. 92H Toledo 72" between
Bliss No. 8A Tie Rod; No. 23A
No. 68-B Niagara, Air Cushion
No. 90-G Toledo, 146" between
housings, 24" Str.; No. 796½-
B Tol., Tie Rod 25" st. No.
409 Bliss Toggle 108" bet.
No. 72 Michigan

PRESSES, O.B.I.

Nos. 1, 2, 3, 4, 6, 6½
Bliss Nos. 20, 21, 102 dbl. crk.

MISCELLANEOUS

Air Compressors — 12x7x10
Chgo. Pneu. 67 H.P. Synch.
Motor
Hydraulic Scrap Baler—150 lb.
bales, Galland & Henning,
66"x62½"x24"
Flanger ½" McCabe
Nibblers: No. 236 Gray 36" th.
No. 2B Campbell ¾"x30 thr.
Syn. motor built-in flywheel
Presses, Knuckle Joint Embos.
600 Ton Waterbury Farrel
Gang Punches, Bertsch, 48"
betw. housings; No. 32 Williams & White
Punches, sgle. end 72" thr. 2"x
1" cap.; 36" throat cap.1¼x1"
Welders, Spot 100 KW Federal
5, 7½, 10, 15, 20 KW



INTERSTATE *Machinery Co., Inc.*

OFFICE AND SHOW ROOM, 109 SO. CLINTON ST., CHICAGO, ILLINOIS

MISCELLANEOUS MACHINES

14x6 Hendey Lathe, cone hd., taper
14x6 LeBlond Lathe, cone hd.
16x8 Hendey Lathe, cone hd., taper
18x12 L&S Patent Hd. with taper
20x10 L&S Patent Hd. with taper
24x10 S&B cone hd. with taper
24x14 S&B cone hd. with chuck
30x12 L&S cone hd. with chuck
30x16 Johnston Triple Grd., b.d.
32x14 L&S Cone Drive
32x28 Bullard Triple Grd.
36x18 S&B cone hd. with chuck
48" Colb. Bor. Mill, 2 swi. hds., m.d.
52" King Bor. Mill, 2 swi. hds., m.d.
52" Gish. Bor. Mill, 2 swi. hds., m.d.
Rockford Dbl. End Hydraulic, m.d.
Dbl. Spdl. Coulter Vert. Diam'd Bor.
3A W&S High Hd. Univ. Tur. Lathe
1½" Landis Dbl. Bolt Cutter, b.d.
2" Landis Dbl. Bolt Cutter, b.d.
3" Landis Sgle. Bolt Cut., leadscrew
C-12 Natco 12x18 Hd. Mult. Drill
No. 13 Natco 14x20 Multiple Drill
C-13H Natco Hydraulic Mult. Drill
No. 14 Natco 16x24 Multiple Drill
No. 40 Natco Straight Line Mult. Drill
D-2 Colburn Hvy. Duty Drill, 2" cap
2D Minster Hvy. Duty Drill, 2½" cap.
3D Minster, Hvy. Duty Drill, 3¼" cap.
7-spdle. Foote No. 2 Gang Drill
Avey No. 3 Dbl. Spdle. Horiz. Drill
No. 6 Jackson Die Sink. Machine
48" Newton Dbl. Spdl. Cont. Miller
12x18 Cinc. Plunge Cut Grinder

WE CARRY A LARGE STOCK OF USED MACHINE TOOLS.
Your inquiries will be appreciated.

The Strong, Carlisle & Hammond Company

1392 West Third Street, CLEVELAND, OHIO

Branch Office: 2832 East Grand Blvd. DETROIT, MICHIGAN

ALL IN STOCK

Beaman-Smith Double Housing Planer Type Continuous Milling Machine, Two Machs. in one on separate columns, 32" Betw. Uprs. Horiz. and Vertical Heads on each col. for rough and finish, 4 Tables 48"x26", Low Price for immed. accept. Condition Like New. M.D.

(3) No. 4 Warner & Swasey Geared Head Full Universal Tur. Lathes, Auto. Chucking, M. D., High Head, Dry Gear Type.

(2) No. 4 W. & S. Full Univ. Turret Lathe, Cone Drive, Friction Head, Bar Equipment, Can be arranged M.D.

Practically New No. 66 Consolidated S.S. S. C. S.G. Press, 4" Stroke, 16" Shut height, Never Used, Right price before Moving.

No. 6-A, No. 9A Marvel High Speed Automatic Sawing Machines, M.D., Recond.

24" American Vee Ram Shaper, Gear Box, S.P.D., 54,000 Serial.

16", 20", 26" G & E Shapers.

18"x12' L & S Q.C.G. Lathe, and Equipm.

24'x12' Porter Q.C.G. Lathe, Chucks, & Equipment, 5 HP M.D. and motor.

36"x16' L&S Q.C.G. Lathe, Chuck, Heavy Duty Turret Slide, New Tailstock.

48"x48"x12' Niles-Bement-Pond Planer, 2 Rail heads, One side head, M.D., Low Price before moving.

No. 454 New Britain Chucking Machine.

No. 652 New Britain Chucking Machine.

(3) Baush Mult. Spdle. Drills, 40 Spdle., Very Low Price, Will sell for Parts.

No. 78 Wilmarth & Morman Surface Grinder.

93"x10" Dia. Pyramid Type Plate Rolls.

2" Buffalo Armor Plate Bar Shear.

R. A. VINE'S MACHINERY WAREHOUSE

654 WEST WILLIS AVENUE DETROIT, MICHIGAN

EMCO REBUILT MACHINE TOOLS

GRINDERS

No. 16-26" Blanchard Vertical Surface, 25 H.P. motor on spindle, late type
No. 10U Norton Lapper, m.d.
12x36" Diamond Auto. Surface, m.d.
18"x48" Diamond L.D. Face, m.d.
30x84" Diamond H.D. Face, m.d.
60" Bridgeport Face, s.p.d.
Springfield Planer Type Surface, m.d.
No. 3 Bryant Semi-Auto. Hole, m.d.
No. 10 Bryant Internal, belt
No. 11 Gid. & Lewis Teromatic, 3 m.d.
5 H.P. Hisey-Wolf B.B. Polishing Stand
5 H.P. Mitchell Type A1 B.B. Pol. Stand
U.S. Elec. Tool Polishing Stand
No. 1, 1½ Cinc. Univ. Tool & Cut., belt
No. 1 LeBlond Univ. Tool & Cut., m.d.
No. 1 Wilmarth & Morman Univ., m.d.
No. 2 Brown & Sharpe Universal, belt
No. 2 Landis Universal, belt
No. 3A-16x48" Cincinnati Univ., belt
6x18" Landis Plain Cylindrical, m.d.
No. 11 B. & S. Plain Self-Cont., s.p.d.
6x30", 6x32", 10x36", 10x50", 14x72" Norton, motor and belt driven types
10x36" Landis Integral Cam, m.d.
10x52", 10x72" Landis Plain Cylin., m.d.
12x18" Cincinnati Plunge Cut, m.d.
12x72" Landis Plain Cylindrical, m.d.
16x52", 16x72" Landis Plain Cylin., m.d.
20x144" Landis Plain Cylindrical, m.d.
No. 4, 6 Gardner B.B. Disc, m.d.
No. 20 Gardner B.B. Comb. Disc & Roll
No. 51 Besley Disc, m.d.
No. 120 Gardner Disc, belt

PLANERS

Morton Traveling Head, m.d., 48" stroke
24" Cincinnati Crank, m.d.
24"x24"x6' Ohio, belt
24"x24"x6' Smith & Silk, m.d.
30"x30"x8' Pond, belt
30"x30"x12' G. A. Gray, belted m.d.
32"x32'x8' Gray, belt
36"x36"x10' Niles, revers. m.d., 3 heads
36"x36"x12' Niles, m.d., 4 heads
36" widened to 42"x12' Cincinnati, reversing m.d., 3 heads
39"x39"x10' Cincinnati Forge, belt
54"x42"x12' Gray, reversing m.d., 4 hds.
55"x55"x30' Betts, reversing m.d., 2 hds.

ENGINE LATHES

14"x6' Bradford, cone
14"x6' Lodge & Shipley, cone
14"x6' Reed-Prentice Geared Hd., m.d.
14"x7' Lodge & Shipley, cone
14"x8' American, cone
14"x10' Lodge & Ship. Selec. Hd., m.d.
16"x6' Hendey Yoke Head
16"x6' LeBlond, cone
16"x7' Pratt & Whitney, cone
16"x8' American Geared Head, m.d.
16"x8' Lodge & Shipley Selec. Head m.d., taper, relieving attach.
16"x8' American, cone
16"x8' Monarch, cone
16"x8' Reed Geared Head, m.d.
18"x8' American Geared Head, m.d.
18"x10' American Geared Head, m.d.
18"x8' LeBlond, cone
18"x8' Mueller, cone
18"x10' Schumacher-Boye, cone
18"x12' Amer. Grd. Head, m.d., taper
18"x14' American Geared Head, m.d.
18"x18' American Geared Head, m.d.
20"x8" American, cone
20"x12' L. & S. Selec. Hd., m.d., taper
20"x13' Boye & Emmes Grd. Hd., m.d.
21"x8' LeBlond, cone
21"x10' LeBlond, cone
21"x16' LeBlond Grd. Head, m.d., taper
24"x10' Bridgeford, cone
24"x11' Chard, cone
24"x12' Schumacher-Boye, cone
24"x16' Schumacher-Boye, cone
24-48"x16' McCabe 2 in 1
24"x18' Lodge & Shipley, Pat. Hd., m.d.
26"x12' Boye & Emmes, cone
27"x16' Bridgeford, cone
36"x18' Niles, cone
42" raised to 53"x29' Putnam, d.c. m.d.

RADIAL DRILLS

4', 5', 6' American Triple Purpose, gear box on base
4' American Triple Purpose, d.c. drive
4', 5' Dreses, gear box
4' Carlton, gear box, inc. head
4' Hammond Jack Knife
4' Morris gear box
5' American Triple Geared
5', 6' N-B-P Semi-Univ., d.c. drive
6' Am. Triple Purp., var. sp. m.d.on arm
7' Fosdick, cone

We carry an average stock of 1500 machines. Send us your inquiries.

THE EASTERN MACHINERY CO., 1001 TENNESSEE AVENUE CINCINNATI, OHIO

72"x48"x14' American Planer, 2-Heads.
30"x10' D. & H. Openside, 1-Head, As Is $575.00.
22"x7' Cincinnati, 1-Head. Nearly New.
24"x6' G. A. Gray and 24"x6' Ohio.
36"x32"x14' Cincinnati, 2-Heads.
6" Merrill A.C. Motor Drive Pipe Machine.
4" Catlin Keyseater with large lot extra equipment.
3-H LeBlond and No. 5 B. & S. Pl. Millers, Cone Drive.
100-200-and 400-ton 48" Wheel Presses.
24"—36"—48"—Spur Gear Cutters.
6—Peerless Shop Saws—6x6" to 13"x16".
10'x14 ga. Ohl Squaring Shear.
40"x18' Prentice—Cone Drive.
30"x30' Niles. Others Most Any Size.
7½"x6 Pennsylvania Air Compressor, 90 Cu. Ft.
15-Punch Presses, 2½" Landis Bolt Cutter, Shapers. Grinders.
34"-36" Bullard Rapid Production Type Vertical Turret Lathe—Serial 54041.
38" Gang Slitter—25 High Speed Cutters.
9" Houston & Richards Metal Band Saw A.C. Motor.
4" Binnse Hor. Boring Milling & Drilling Machine. D.C. Variable Speed Motor.
5' Niles-Bement-Pond Full Universal Radial, Pl. Base A.C. Motor.
6"x18"—12"x24"—12"x48" Cincinnati Pl. Grinders.
50 Lb.—75 Lb.—200 Lb. Hammers.
25-Turret Lathes.
24"x48"x10' Rahn-Larmon Sliding Bed Gap Lathe, A.C. Motor.
Lucas 15 and 30-ton Forcing Presses.

THE NORTON-BROADWAY MACHINERY CO.
610 Baymiller Street, - - - - - CINCINNATI, OHIO

Over 30 YEARS' EXPERIENCE IN REBUILDING MACHINERY

VERTICAL BORING MILLS
2-24" Bullard New Era, Ser. over 9000-12105
42" King, arr. M.D., 2 sw. hd.
42" Colburn, 1 sw., 1 tur. hd.

UNIVERSAL GRINDERS
No. 1 & 2 Brown & Sharpe
No. 2 Landis, arranged M.D.
No. 3 Landis.

SURFACE GRINDERS
No. 3 Abrasive, M.D.
8" Pratt & Whitney Vert.,M.D.
8" Arter Rotary
No. 255 Heald Rotary
No. 16 Blanchard hi. pwr., Ver.
No. 16A Blanch Auto., 3 m.d.

LATHES
14"x5' Amer. Geared Head
12"x6' Hendey Yoke Head
14"x6' Amer. Geared Head
16"x6' South Bend
20"x8' Cisco, Taper Attach.
30"x11' Amer. Heavy Duty
20"x12' Lodge & S. tap. att.
24"x12' Cisco, taper attach.
25"x12' LeBlond Hvy. Duty.
42"x12' Pittsburgh
26"x16' White., tap. att.
27"x16' L. & S. 12 sped. g. head, taper attach.
26"-48"x24' McCabe Dbl. Sp.

MILLERS
3" Waltham Thread, M.D.
6"x14" P. & W. Thread
6"x48" P. & W. Thread
6"x80" P. & W. Thread
No. 2 Van Norm. Dup.,arr.M.D.
New No. 14 Prod. Pl., arr.M.D
No. 2 Kempsmith Plain
No. 2YB B. & S. Pl., M.D. taper nose spindle
No. 3B K. & T. Plain, M.D.
No. 4 Brown & Sharpe
No. 13B Brown & Sharpe Pl.
No. 33 B. & S. Plain, M.D.
No. 2 Brown & Sharpe Vert.
No. 6 Becker Vertical
No. 4 Kemp. Vert. rot. table
2-No. 3 Brown & Sharpe Univ.
24" Garvin Cam

PRESSES
No. 72 & 73 Cons. Geared
No. 5R-16 Stand. Str. Side R.
No. 73½ Bliss S.S. Trimming
No. 1½ Bliss D.A. Toggle Drw.
25 Ton Henry & Wright Die.
450 Ton Watson Still. Hyd.
2-No. 702 Bliss Flat. Edge Tr.

SCREW MACHINES
Lge. sel. B.&S. Hi. Sp. & F.A
1 1/16"-1¼" Cleveland Model B
6-⅜" Cleveland Model B
9/16" Gridley Model G, M.D
⅜" New Britain, M.D.
1"x5" New Britain, M.D.
1-⅛"x7" New Britain, M.D.
No. 5A & 6A Potter & Johns.

TURRET LATHES
2¼"x24" J. & L. Steel Head
3"x36" J. & L. Steel Head
3¼"x36" Acme
No. 6 W. & S. Geared Head
24" Steinle Geared Head
3¼"x40" Greenlee

J. L. LUCAS & SON, INC.
3 FOX ST. — BRIDGEPORT, CONNECTICUT

Reduce operating costs with MILES REBUILT tools

PRACTICALLY NEW TOOLROOM MACHINES
FOR IMMEDIATE DELIVERY

The machines will be shipped directly from discontinued toolroom of a high grade manufacturer. The units are about two years old and have had very little service.

Model "J-D" Do-All Contour Machine
26" Jarecki type BB Screw Press
6"x6" Peerless High Speed Hack Saw
Leeds-Northrup Hump Recording Controller
No. 2 Leland Gifford 26" sgl. spl. Drill. M.D.
Oliver of Adrian Drill Grinder, M.D.
No. 5 Dumore Grinder
Lindberg Electrically Controlled Tempering Furnace

PRESSES

No. 5-I Cleve. OBI, 2½" str., 2100 lbs.
No. 6 Toledo OBI, 2¼" str., 7000 lbs.
No. 6 Bliss Consol. OBI.
71 ton Waterbury F. OBI, 4" str. 8300 lbs.
No. 10-I Cleve. OBI, 4" str. 14,000 lbs.
No. 7 Bliss Consol. OBI 3½" str.
No. 75 Toledo, grd., openback non-inclin., 2½" str., 4500 lbs.
No. 76 Toledo openback grd., 3" str. 7500 lbs.
Fremont openb. non-inclin., 2¼" str. 4-⅝" cr.
Waterbury Farrel openback non-incl., 1½" str., 3½" cr., 3700 lbs.
No. 55 Toledo straight side, dbl. grd. 10" str., 14,000 lbs.
No. 55½ Toledo straight side, flywheel dr. 5" str., 9500 lbs.
No. 55½ Toledo straight side, grd. 4" str., 13,000 lbs.
No. 56 Toledo straight side, flywheel dr. 5" or 6" str., 12500 lbs.
No. 65 Bliss Cons. grd., 3" str., 9000 lbs.
No. 66 Cons. 5" str., 12,500 lbs.
No. 74½ Bliss straight side, 6" str. 8500 lbs.
No. 7 Rockf. str. side, grd., 3-¾" str., 9000 lbs.
No. 8-7 Zeh & Hahnemann straight side, grd., 2-¾" str., 6000 lbs.
No. 30-¾ Bliss arch. fr., grd., 4" str., 8000 lbs.
No. DG54 Ferracute cam drawing 2" & 5" strokes, 5400 lbs.
No. 1½ Bliss toq. draw., 5"&8½" strs.,9250lbs.
No. 164 (173) Toledo toggle draw., 16" & 9½" strokes, 18,500 lbs.
No. 661 Toledo toggle drawing press.
No. 4A Bliss horning, 3½" str., 4825 lbs.
No. 5A Bliss horning, 3" str., 8000 lbs.
No. 16 Bliss horn., elev. ta. 1½" str. 1150 lbs.
No. 41N V&O adj. knee for notching
No. CA 14 Ferracute adj. knee
P2 & P3 Ferracute knee type
EG 35 Erie Foundry geared knee type
Nos. 41 & 41A Toledo horning
No. 9A Bliss Consol. gap frame knee type
No. 25½ Bliss Consol. horning, extra height & 12" stroke
No. 25½ Bliss Consol. horning, geared M.D.
No. 30¾ Bliss grd. arch 4" str.
25 ton Oilgear hydraulic
100 ton French Oil Machy. Co., high speed hydraulic
750 ton Baldwin Southwark triple action hydraulic toggle drawing

GEAR MACHINERY

No. 12 Barber Coldman gear hobbers
No. 4 Brown & Sharpe spur gear cutter
No. 12 HS Gould & Eberhardt spur gear hob.
No. 18 H 18" Gould & Eberhardt gear hobber
No. 18H Gould & Eberhardt gear hobber
28" Gould & Eberhardt spur & bevel gear cutter
36"x6" Gould & Eberhardt spur gear cutter
No. 2G Gould & Eberhardt gear cutter grinder
No. 1 Lees Bradner gear hobber
No. 5A 14"x8" Lees Bradner gear generator
No. 5A 14" Lees Bardner gear hobber
No. 10B Lees Bradner gear grinder
No. 17A Fellows gear shaper
No. 4M Fellows involute measuring machine
15" Gleason quenching machine
Gleason bevel gear testing machine
Lipe double spindle gear chamfering machine
No. 2 Bilton automatic gear milling machine
National Cleveland Model B gear Checker

ASK FOR LATEST STOCK LIST No. 170.

MILES MACHINERY CO., SAGINAW, MICH.

ESSLEY *Machine Tools*

Special Offerings

Bar cutter, No. 8 Buffalo, cap. 2¾ rds., 2½" sq., 5"x5"x⅝" angles, 6"x⅞" flats.

Alligator Shears (2), Lewis, capacity 3" and 5" round, 18" and 24" blades.

10' Dreis & Krump, 3/16" capacity squaring shear, m. d.

24"x14' Lodge & Shipley lathe, cone drive.

THE E. L. ESSLEY MACHINERY CO.
831 W. EVERGREEN AVE.-CHICAGO, ILL.

LARGE and VARIED STOCK
High Grade Machine Tools
USED and REBUILT

BORING MILLS—Horiz. & Vert.
PLANERS
LATHES
TURRET LATHES
GRINDERS—Universal, Plain, Internal, Rotary
GEAR HOBBERS—
GEAR CUTTERS—
RADIAL DRILLS—
and all other types of machine tools

Send your inquiry to:

MOREY MACHINERY CO., Inc.
410 Broome Street, New York City

VERT. BORING MILL — 54" Colburn, power rapid traverse, Self-contained.
RADIAL DRILLS—6' N. B. P. full univ. grd. m. d. Cinc.-Bick. 4'; Bick. 4'; Foodick 3' and 2½'.
TURRET LATHES—W. & S. No. 2A, chuck. J. & L. 3x36, chuck. 2½x24 chuck. Gisholt 21x 3½ chuck. W. & S. No. 4, bar feed, (5).
PRESSES—No. 662 Tol. 250-ton cap., coin., No. 660 Tol. coin., 100-ton. Bliss o.b i. Nos. 23; 21½; 21; 20-B; 20; 19-C; 19; 18 Stoll No. 138-B and No. 79-B dble. crk., grd.; bed area 48x42, 48x36.
GRINDERS—No. 3 Cinc. centerless. Heald 12" rot. Heald No. 70 Internal. Landis No. 3 Univ. Norton 14x50 plain. Cincinnati 12x36 plain.
HYD. WH. PRESS—350-ton; 54" bet. strain bars.
SPOT WELDERS: 10 to 90-KW.
KEYSEATERS—Baker No. 3; Davis No. 1.
AIR COMPRESSORS—Bury 500' two-stage; Am. 500' two-stage; Am. 168' Tandem, Bury 9x8; Blaisdell 9x8; Curtis 6x6.

FALK MACHINERY COMPANY
18 Ward Street, Rochester, New York

— PARTIAL LIST —

28"x10' Hamilton Lathe, Q. C. G. Cone.
24"x10' Swings 27½" Greaves-Klusman, Q. C. G. Lathe, 20" 4 jaw chuck, Cone.
20"x8' Hamilton Lathe, Q. C. G., T. A., Cone.
No. 2A Brown & Sharpe Universal Mill.
2¼" Acme Turret Lathe, Wire Feed Cone.
16"x42" Landis Crankshaft Grinders, Self-contained Countershafts, Motor Drive.
No. 2 Morse Universal Grinder 12"x30".
No. 4 Landis Universal Grinder 12"x66".
16" G. & E. Shaper, Cullman, Motor Drive.
16" Steptoe Shaper, Cone.
4½' Morris Radial, Gear Box, S. P. D.
3½' American Radial, Gear Box, Swinging and Swivel Table, S. P. D.
No. 1 Hoosier Heavy Duty Drill, 2" Cap. M. D.
No. 3 ¼"x52" L. & A. Shear, 18" Gap.
No. 6-B Niagara Punch, 30 ¼" Holes.
New No. 5½ SA Standard Swaging Machine, Cap. 2¾" Dia. Tubes.

IROQUOIS MACHINERY CO., 660 Ohio St., Buffalo, N. Y.

Good Used Machinery

ARC WELDER—G. E. 200 amp., m.d.

BORING MILLS—Niles 36" c. d. Baush 44" m.d. Bullard 51" Vert., 2 hds., Bullard 42" Mill, vert.; Rockf. No. 2 horiz., 3⅛" Bar; Colburn 42" Vert. 2 Hds.

BRAKES—D. & K., 5' Box & Pan, 14 ga. Keene 10' 16 ga. Toggle Press.

CRANES—2 P & H 10-ton, 50' span.

DRILLS (RADIAL)—Mueller 2½', Fosdick 2½', Fosdick 4', Carlton 4' all gear box dr.; Hammond 4' sensitive; Mueller 4½' q. box.

DRILLS (H. S. B. B.)—H & W 2, 4, 5sp.; Allen 2 & 6-sp.; Avey, Demco, Lel-Giff. 1-sp.; Avey 2-sp.; Aveymatic 2-sp., m.d.

DRILLS (MISC.)—Baker No. 217 (2) & No. 314 Hvy. Duty; Hamilton 42" S.H.; Barnes 20" & 24" 1-sp. & 20" 4-sp. & 24" 3-sp. all grd. camel back; P & W No. 12 Multi-Sp.; Natco 20-sp. Rect. head.

GEAR CUTTERS—G & E 60" & B & S 26" s. p. d. automatic spur; Fellows 24" gear shaper. Cincinnati 36" gear cutter. G. & E. 48" gear Cutter.

GRINDERS—P & W 12" vert. surf.; Cin. No. 1½ & B & S No. 12 univ. tool, B &S Nos. 11&16 pl.Heald Nos.60&65 Int.; Landis 10x30" Plain; B & S 10x48"; 3—Norton 6x32" plain, Heald No. 20 Rotary Surface (3). B & S No. 2 Univ.; Badger No. 220, auto. d. e., opposed disc (4); Modern No. 6 Int.; Brown & Sharpe No. 2 surf.; B. & S., No. 10 pl. self-cont.; Norton 10" x 36"; B. & S. No. 13.

KEYSEATERS—Mitts & Merrill No. 5 vert. Davis No. 1; M.&M. No. 0; Catlin No. 2. Catlin No. 4.

LATHES—Monarch 16"x10' M.D.; LeBlond 18x8'; Lehmann 18"x9'; Amer. 22x8'; Davis 22"x10'; L & S 20"x10'; S-B & E 20"x10' q. c. g; Flather 22"x10'; Bradford 21"x10'; LeBlond 16"x8'; P & W 17"x10'; Gleason 45"x12'; Monarch 16" x 8' (2); Ryerson 20x10', m.d.; Sebastian 20"x14' QC.G. M.D. Grd. Hd.; Mueller 22"x12', S.B.&E. 30"x12' Q.C.G.

MILLING MACHINES—B & S No. 1, Cin. No. 1½, Ohio No. 29, Kemp. No. 3 & Brown & Sharpe No. 3 Universal; Dow No. 1, Ohio No. 20, American No. 1½, Becker No. 2, Rockford No. 2, Cin. No. 2, Kemp. No. 3, Cin. No. 3, Hendey No. 3, B & S No. 3, LeBlond No. 3-H, LeBlond No. 4 M.D. C.D. & Cleveland No. 2 S.P.D. Plain, Cin. 24" Auto. Plain; Kemp. No. 33 S.P.D. Prod.; Becker No. 6 and Model "B" Vertical; Owen Duplex; Ingersoll M.D. Slab Miller 4 heads.

PLANERS — Gray 30"x30"x10' 2 heads; Gray 48"x48"x10'; Gray 28"x28"x6' 1-hd.; Pond 32"x34"x10'; Hamilton 60"x 36"x10', 2 heads.

PUNCH PRESSES—Federal Nos. 1, 2, 3 o.b.i.; Bliss No. 62 geared; Bliss No. 18 & 19; Ferracute No. P-4; Toledo No. 52 arch; Fer. No. EGF 52 Coining; Willard No. 4A o.b.i.; Swaine No. 38 arch, Swaine No. 37 O.B.I.; Rockford Nos. 2 & 3; and Verson No. 4 O.B.I.; Bliss No. 19½; Michigan No. 4 O.B.I.; Bliss No. 20 O.B.I.

SAWS (HACK)—Rac. 6x6" h.s.; Rac. 8x8; Peerless 6x6" H.S. (4); Atkins 8x8" Universal Shaping (2).

SHAPERS—S & M, G & E, Ohio, Mi., Q. City, Davis, Cin. 16"; Ohio & G & E 20"; S & M, Q. City, Rock, Cin. 24"; Ohio 26"; Cin. 24" s. p. gr. box; Rhodes 3½" Vertical; American 24" heavy, b.g. Amer. 15"; Springf. 15"; S.&M. 26", b.g. G. & E. 24", s.p., gearbox.

SCREW MACHINES—W.&S. Nos. 4, 6, & 8 Hand; Nat. Acme. Nos. 515, 52, 55, 4-sp.; Gridley 4-sp. ⅞"; Automatic, Gridley 4 spindle, 2¼".

SLOTTER—Bement-Miles 10" vert.; Barr 12".

SQUARE SHEARS—Stoll 42", 14 ga.

TAPPING MACHINES—(2) Garvin No. 2 & 2X Vertical Automatic & Garvin No. 1.

TURRET LATHES — Bullard 36" vertical, rapid production. Bausch 30" M.D.; Bullard 24" vert. rap. prod.; W.&S. No. 8; Cin. Acme Grd. Hd.

Above is only a small part of our large stock on hand

McDonald MACHINERY CO.
1531-35 N. Broadway ST. LOUIS, MO.

OTT MACHINERY SPECIALS

AUTOMATICS: Acme Model C, 5 Spindle, 1".
Cleveland, model A, 1½, 2, 2½, 3½ and 3¾".
Cleveland, Model C—1¼" Motor Drive.
Gridley, Model G, 4 Spindle, ⅞ and 1¼".
Gridley, Model F, 4 spindle, 1⅛" and 1¼".

DRILLS, Deep Hole Drillers, P. & W. 6Sp. Vert.

GEAR HOBBERS, Lees-B. Nos. 1, 5A & 8A C.

GRINDERS, Brown & S. No. 2 Surface, M. D.
Bryant No. 3 Internal, Motor Drive.
Heald Nos. 55, 60, 65, 70, and 75.
10x30" Webster-Perks Universal.
Norton Plain, 6"x32", 10"x24, 36", 50".

Landis, 10x20" Hydraulic, 30" Wheel, M. D.
Landis, 10x36 & 52" Plain, S. C.
Landis No. 2 universal, G 5.

LATHES, Cisco, q. c, 20"x8'.
Hendey, q. c. 16"x8' & 18"x10'.

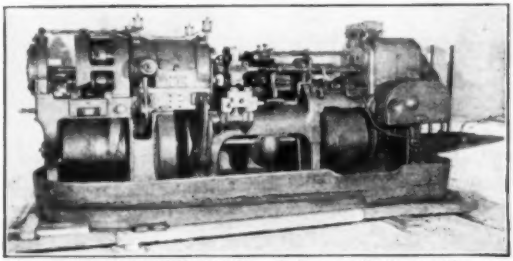
MILLS, No. 2 Van Norman Duplex, M. D.
No. 3 Brown & Sharpe Plain, Cone.

PRESSES, O. B. I. Toledo Nos. 3, 6, 6½.
No. 77½ Bliss, S. S., S. C. Tie Rod, 14" Stroke.
No. 79½ Bliss, S. S., S. C. Tie Rod, 12" Stroke.

SHAPERS, 24" G & E. Motor & Reeves Drive.
16" and 24" Cincinnati, Cone.

OTT MACHINERY SALES, Inc., 548 Second Ave., DETROIT, MICHIGAN

GOOD MACHINES



3' Model "B" National Acme Automatic
3¾" Model "B" National Acme Automatic

Brown & Sharpe Automatics
No. 00G, No. 0G, No. 00, No. 0, No. 2's — All Sizes.
Full Automatics & Turret Formers

MISCELLANEOUS

1—No. 6 Warner & Swasey Universal Geared Head Turret Lathe
1—No. 4 Warner & Swasey Motor Driven Turret Lathe
2—Model "B" Turret Type Norton Grinders 4"x5"
2—No. 132 Arter Automatic Cylindrical Grinders
1—12"x36" Landis Plain Cylindrical Grinder
1—30"x30"x18' Gray Planer, 2 heads
1—No. 13-C Natco Hydraulic Multiple Drill
1—No. 14 Natco Multiple Drill
2—No. 12 Brown & Sharpe Plain Grinders
2—No. 3 Cincinnati Plain Millers, slotted S.N.
1—No. 6 Gardner M.D. Disc Grinder, 26" discs
1—No. 24 Gardner Horizontal Disc Grinder, 53" disc
1—No. 24 3-spindle Foote-Burte Drill
1—No. 1B Cleveland S.E. Punch—36" throat
1—1½" Acme Upsetting & Heading Machine—steel head M.D.
1—11'x16 Ga. Stoll Square Shear
6—6-A Potter & Johnson Lathes
3—Lodge & Shipley Crankshaft Lathes
50—Drills of all sizes

These are but a few of the many items we have in stock.

RIVERSIDE MACHINERY DEPOT

255 ST. AUBIN AVE. **DETROIT, MICH.**

VICTOR'S BARGAINS
IN
NEW HIGH SPEED DRILLS
ONE OF THE FINEST
POLISHED FLUTES
STRAIGHT SHANK TWIST DRILLS
Jobbers or Short Length

Size Inches	Our Price Net Per Dozen High Speed	Length Overall Inches
1/16	$ 1.46	2 1/2
5/64	1.52	2 5/8
3/32	1.56	2 3/4
7/64	1.66	2 7/8
1/8	1.76	3
9/64	1.90	3 1/8
5/32	2.05	3 1/4
11/64	2.19	3 3/8
3/16	2.36	3 1/2
13/64	2.56	3 5/8
7/32	2.79	3 3/4
15/64	3.05	3 7/8
1/4	3.29	4
17/64	3.65	4 1/8
9/32	4.01	4 1/4
19/64	4.38	4 3/8
5/16	4.75	4 1/2
21/64	5.23	4 5/8
11/32	5.72	4 3/4
23/64	6.21	4 7/8
3/8	6.70	5
25/64	7.29	5 1/8
13/32	7.91	5 1/4
27/64	8.50	5 3/8
7/16	9.12	5 1/2
29/64	9.72	5 5/8
15/32	10.34	5 3/4
31/64	11.07	5 7/8
1/2	11.79	6

In assorted lots of 12 dozen a discount of 10% will be given

Will Sell any Part Of A Dozen At Same Price

Money Refunded If Not Satisfied ***Send For Our General Catalogue***

VICTOR MACHINERY EXCHANGE, Inc.

251 Centre Street, New York, N. Y.

"CLEAN TOOLS"

14"x6' L. & S. Lathe, Q. C. G., T. A., D. B. G.
24"x27"x8' Ingersoll Mill, adjus able rail, 3 heads.
No. 25 Becker plain Mill.
No. 1 Kent Owens hand Mill.
No. 4 Fox plain Mill, geared hd., M. D.
No. 1 Davis Keyseater.
No. 00 Baker Keyseater.
2000 Amp. Bogue Gen Set, M.D., 6-12 v.
2500 Amp. G. E. Gen. Set, M.D. 6-12 v.
No. 46 Cons. S.S. grd. Gap Press, 6" str.
No. 6N Am. Can S. S. grd. Gap Pr., 88 t.
No. 8 Cleve. O.B.I. Punch Pr., (No. 5 size).
250 Ton Bement Hor. hyd. Wheel Press.
1¼" Cone four spindle Auto., M. D.
80 lb. Economy Scrap Baler, M. D.
No. 5A Potter & Johnson Chuck. Mche.
No. 4 Warner & Swasey Turret Lathe.
No. 6 Bryant Chucking Grinders, (4).
No, 1N Norton Lapping Mche., M. D.
More than 50 Automatic Screw Machines of various sizes and types in stock.

LAKE MACHINERY CO.
652 W. LAKE ST. CHICAGO, ILL.

15,000 USED STACKING BOXES

ILLUSTRATION SHOWS BOXES STACKED 3 HIGH

$1.00 EACH
F. O. B. CHICAGO **Excellent Condition**

24"x15"x7½—16 gauge. Olive Green Finish. Drop Handles Both Ends. Weight 16 lbs.

PASSMAN BROTHERS
705 W. Washington Blvd., Chicago, Ill.

LATHES

60"x18' Niles, b. d., 12' centers
54"x16' Johnson, m. d., triple grd.
32"x24' American, belt drive
18"x10' Greaves Klusman
16"x8' Von Wyck, belt dr., q.c.

DRILLS

4' Fosdick plain radial, s.p.d.
3 spindle Allen B.B. sensi. belt dr.
20 spindle Natco, mtr. dr. head 14"x27"

MISCELLANEOUS

No. 4 Pratt & Whitney Vertical Die Sink. & Milling Mch., table 18"x72".
2" Landis Pipe Machines
18" Gould & E. Gr. Hob., cap. 30"x12"
36"x36"x8' Cincinnati Planer, 2 heads, rap. trav., belted mtr. dr.
"G" Rock River Punch 24" throat cap. ¾"x¾", motor drive

—FORGE SHOPS ATTENTION—
BARGAIN PRICES ON BOARD DROP HAMMERS 1000 LBS. TO 2000 LBS. CAPACITY

THE O'BRIEN MACHINERY CO., - 113 N. Third St., PHILADELPHIA, PA.

NEW 3 Phase B. B. Motors ½ to 25 H. P., 5 H. P. $55.75

DRILLS

20" Lever, Wheel & Lever and Power Feed.
24" and 28" sliding head, back gear, power feed.
Bausch Multiple 16 spindle No. 1 Morse Taper.
4 spindle Foote-Burt, heavy duty.
6 spindle Hole Hog No. 1 Morse Taper, power fd.
1, 2 and 4 spindle high speed 8" overhang.
5' Bausch Radial Drill.
59 other drills of various sizes and types.

MISCELLANEOUS

Brake, Robinson, toggle, 5'.
Brakes, 6' and 10' for 18 gauge.
Grinders, cutter and cylindrical, plain and univ.
Grinders, Bryant deep hole chucking.
Broaching machine, No. 1 LaPointe.
24"x 12' South Bend Lathe, with raising blocks.
31 other lathes 10" to 24" swing, 5' to 14' beds.
Milling Machines, Nos. 1½, 3 and 4 plain.
Milling Machine, 20"x20"x8' Ingersoll Slab, m. d.
Milling Machine, No. 1 Bilton, automatic gear.
National Acme Automatics Nos. 52, 53 and 55.
Shapers, 16", 18", 20" and 24" b. g. crank.
Turret Lathes, 21" and 24" Gisholt, m. d.
Planer, 36"x36"x14' Gray Standard Pattern.
Press, No. 24 Toledo double acting cam drawing.
MOTORS, REBUILT 3 Phase ½ to 50 HP various speeds.

This is only a partial list of our large stock, which is constantly changing. Write for what you need

THE OSBORNE & SEXTON MCHY. CO., Dept. H. COLUMBUS, OHIO

"Burns Best Bargains"

AIR COMPRESSORS
Ingersoll-Rand 12x8 pres. 50 lbs.
Sullivan, 10x8 horiz. type W.G. 6, 50 lbs. pressure.
Bury 6x6 single class L.

AUTOMATICS
Gridley 4-spdl. Mod. F, 3/4" 14".
Cleveland, 3/4" Model B, 2" Model A, 5-hole (4).
Gridley, 24" single spindle..
Gridley, 1 1/2", 3" mod. F, 4-spdl.
Acme No. 52—4-spindle.
Acme, No. 53—1" 4-spindle.
Potter & Johnson No. 6-A Chucking (4).
New Britain No. 24 chucking with tapping attach.

BORING MACHINES
Barret Hor. Boring Bar, 3 1/4".
Barnes No. 1 horiz. dbl. sp. Boring & Drilling (2).
Moline No. 5 hole hog, 6-sp. SPD.
Niles, 4 7/16" spdl. dia. Bor. Bar
Betts 3" spindle

BRAKES
Brake, Dreis & Krump 4' box & Pan, cap. 16-Ga.
D. & K. No. 316—3' cap. 16ga.
Dreis & Krump 6' hand, cap. 16 ga.

BROACHING MACHINES
LaPointe No. 1, No. 2, No. 3-B.

DRILLS
Colburn No. 4D heavy duty, comp. table, S.P.D.
Avey matic 2 Sp. M.D. pump & tank, 12" overhang.
Leland-Gifford 2 Sp. P.F. on one Spd., M.D.
Leland-Gifford 2 Sp. P.F. on each Spd., M.D
Barnes 4 Spd. all geared, self-oiling, 20", M.D.
Allen Hor. P.F. on ea. spdl. M.D. (2).
Sundstrand Hor. Center. & drill.
Barnes, 20"—4-Sp. morse taper No. 4. P. F. on each Sp.
Allen, 6-Spindle B.B.overhang 7"
Leland & Gifford 4-Sp. H.S. B.B. equipped with tapping chuck on each spindle.
Bausch No. 4 Mul., 28" Sp.B.D
Nateo, No. 11, 12-sp. No. 1 taper, P.F., B.D

RADIAL DRILL
Fosdick 2-1/-9" round column G.B.D.

GEAR HOBBERS
Fellows No. 6 & No. 65.

GRINDERS
Heald, No. 60 Internal B.D.
Murray, Disc 24"discs, disc press.
Bryant, No. 10 chucking.
Van Norman No. 3 1/4 Automatic Internal Radius B.B.
Ingersoll cutter Tub (2).

HACK SAWS
Peerless 6x6 H.S. B.D.
Marvel No. 5 H.S. B.D.
Racine 12x12.
Racine 6x6.

HAMMERS
Mayer 100-lb. trip.
Niagara 200 lb. board drop.
3-A Hi.-Speed, arr. for M.D.

LATHES
Chard 18"x8' qk. chg.
Porter-cable, 9x14 grd. hd.
Sunstrand, 9x24 Mfg.grd.hd.M.D.
LeB. qk. chg. cone hd. 24"x16'
Schumacher-Boy qk. chg. 24"x 16' cone-hd.
McCabe double spindle 26x48x12'
Lodge & Shipley Grd. Hd. 30"x 16' qk. chg. arr. for M.D.
Fifield 40"x12" loose-change.

"SPECIAL"
Univ. 2-1/" horiz. bor., drill. & Mill. Mach. S.P.D.
W. & S. No. 2-A Univ. M.D.
L. & S. 30"x16' grd. hd. qk. chg. arr. for M.D.
LeBlond No. 3-H Univ. Miller, eqp. vert. hd.&slot.at.

MILLERS
Ingersoll 24x24x16', two side hds., one hd. on rail M.D.
Pratt & Whitney No. 4 vert. Die Sinking, equip. with cherrying attachment.
Steptoe No. 0 hand, Bristol No. 2 hand, U.S. No. 1 hand M.D.
Burr keyseat planer type, vert.sp.

PRESSES
Robinson No. 40-B D.C. stroke 4"—40" wide
Consolidated No. 55 Trimming, side shear, F.W.T., MD.
Niagara, 5-8 dbl. action Cam.Grd.
Beatty No. 7 single end, 6' M.D.
Williams & White No. 13 single end grd. 36" throat, M.D
Rock River No. G-15 single end 16" throat.
Cameron, No. 30 arch F.W.T.
Niagara, No. 13 horn. F.W.T.
Kling, No. 4 single end, 15" throat grd.
Kling No 2 single end, 19" throat F.W.T.
Bliss No.18, No. 19, No. 21 inc. f.w.t.
Bliss, No 269 toggle joint kick.
Bliss No. 3-B Toggle single grd. 8" str.
Bliss No. 68 dbl. action F.W.T.
Zeh & Hahnemann No. 8 power percussion str. 8".
Toledo No. 52 Arch.
Adriance No. 45 dbl. action cam
American No. 5 f.w.t
Verson No. 0 bench type, M.D.
200-ton hydraulic tire
Dunning & Boschert hyd. 50-ton cap. 20" str.
Barnes Screw (2)

PLANERS
Gray 24x24x6', one head.
Woodward & Powell, 30x30x8.

SHAPERS
Milwaukee 24" bk. grd. C.D.
G & E 20" bk. grd. C.D.
Potter & Johnson 15"
Walcott 16" bk. grd. M.D.
Hamilton V-ram, M.D.

SHEARS
Pexto, No. 276 circular 16" thrt.
Pexto, slitting 18" throat.
Pexto, No. 255 slitting 18" thrt.
Swaine, slitting 16" throat.
Badger, No. 27 power splitting blade 12".
Badger-State, angle cap. 4x4x3/8.
Niagara No. 296 power, length of cut 96", cap. 1/4 B.D.
Niagara No. 772 power, 15" gap, cap. 3/16, lg. cut 72", B.D.
Niagara, circular 34" throat.
Rapid No. 25 power circular.
Quickwork, rotary 60", cap.14-ga.
Yoder rotary 60", cap. 14-gauge.
E. & K. 8' power cap. 16 Ga.
Pexto 36", 36" foot power cap. 18 ga.

TURRET LATHES
Steinle 24" Grd. Hd. M.D. 6 1/" hole in spdl.
B. & S. No. 6 Hd. M.D., pwr. fd.
Warner & Swasey No. 7, fr. hd.
Greenlee, flat turret.
Dreses 16x5' fox.
Warner & Swasey's, No. 1, No. 2, No. 2A Univ., No. 4, No. 6.
Pratt & Whitney 1-1/"x18" cap. P.F.
Pratt & Whit. 1"x14" P.F. (3)

WELDERS
Agnew No. 10-D type D.
Taylor, 7 1/2 KW, K.V.A. 10.
Todd twin arc, H.P. 7, 150 amp.
Dyer 2 1/2 KW bench type.

WIRE STRAIGHTENER
Wells, cap. 3/" and 1/".

MISCELLANEOUS
Rock River No. 9 horiz. bending & straight, all steel const.M.D.
Bliss No. 119 thread roller.
Betts Die Slotter 16" throat
Brown & Sharpe hob grind. at.
Oster No. 300—pipe threading machine cap 2".
Consolidated No. 3 double seaming machine.
Blakelee metal parts washers (2)
Reetz No. 5 horiz. pres. blower.
Keller E-4 Auto. Profiling Mche. for die sinking.
Garvin Die Slotter.
Niles Die Slotter 36"
Erie Steam Hammers, 800 lbs., 1000 lbs., 1500 lbs.

F. W. BURNS MACHINERY CO.
1441 NORTH THIRD STREET. - - - - MILWAUKEE, WIS.

SELECT Inland TOOLS

POWER PRESS BRAKE

Cincinnati 6' ¼" Capacity, All-steel Construction, A. C. Motor Driven, LATE TYPE.

UNIVERSAL IRON WORKER

Ryerson Steel Construction, High Power Quintuple, Motor Driven, Capacity: Shear Plates ½"; Punch ¾ through ¾; Angles 4x4x½.

TURRET LATHE

No. 7 Foster, geared head, over 70,000 serial, bar feed motor driven.

PLANER

48"x48"x18' Putnam, 4 heads.

THREAD MILLER

6"x14" P. & W. Serial 1521, Gear Dr., Excellent Condition.

POWER SQUARING SHEARS

6' & 10' Dreis & Krump, Chgo., 14 ga. cap. All steel Cons., A. C., M. D.

PUNCH PRESS, Straight Side

No. 64 V. & O. back geared, 22" between uprights, crank-shaft dia. 4½", stroke 5".

Inland Machinery Company
41 So. Clinton St. Chicago, Ill.

TURRET LATHES: No. 2A & No. 4 W. & S. Universal; No. 8 B. & O.; 24" Gisholt 6¼" hole through spindle.

LATHES: 20"x10' American, rebuilt; 21"x10' LeBlond.

MILLING MACHINES: No. 1½ Rockford; No. 2 Kempsmith universal; No. 2 Kempsmith plain; No. 6 Becker vertical; No. 6 Jackson Die Sinker.

SAWS: 4x4, 6x6", Marvel, 6x6, 8x8", Racine, 10x10" Peerless, motor drive.

BRAKES: Chgo Steel Press 5' 14 ga. m. d.; D. & K. apron, 8' 3/8" m. d.; 4' 3/8" b. d.

Large Assortment Good Machinery at Fair Prices.

ACME EQUIPMENT CO.
128 S. Clinton St. :-: Chicago, Ill.

Brakes, hand, 8' 18 ga., 8' 14 ga., (2).
Band Saw, No. 8 Marvel, motor dr.
Grinders, surface, No. 2 Reid; No. 2 LaSalle.
Lathes, 14x6 American, geared head, m. d.; 18x6 Monarch geared head, m. d.; 21"x10 LeBlond, 12-speed geared head.
Millers, No. 1A Brown & Sharpe Univ. M. D.; Nos. 2A & 4B Becker verticals; No. 1 B. & S. Vert., M.D.
Punch Presses, Nos. 1 to 5 O. B. I.; several straight sided.
Radial, 4' Dreses, S.P.D.; 3' Western.
Shapers, 24" Stockbridge, M. D., (2).
Turret Lathes, Nos. 4 & 6 Warner & Swasey, complete with bar equipment.
Welders, Arc, 200, 300, 400 Amp. Lincoln.

300 High Grade Tools In Stock.

VICTOR Machinery Co.
130-132 South Clinton St., Chicago, Ill.

Guaranteed

20"x8' SIDNEY "TRITROL" 16 SPEED TIMKEN BEARING GEARED HEAD LATHE. HERRINGBONE GEARED. MOTOR IN BASE. FACTORY REBUILT.

14" P. & W. HYDRAULIC VERTICAL SURFACE GRINDER. A. C. M. D. LATEST TYPE, LIKE NEW.

72"x54"x24' POND DOUBLE HOUSING PLANER, TWO HEADS ON CROSS RAIL. TWO SIDE HDS., B. D.

54" BULLARD NEW ERA VERT. TUR. LATHE, SIDE HEAD AND 4 JAW CHUCK TABLE, A. C. M. D.

No. 2A W. & S. UNIV. HOLLOW HEXAGON TURRET LATHE, BAR & CHUCKING EQUIPMENT, M. D.

NO. 4 KEMPSMITH PLAIN MAXIMILLER. ARRANGED MOTOR DRIVE. NO MOTOR.

NO. 1½ B. S., K. & T. UNIVERSAL MILLER. FULLY EQUIPPED. S. P. D.

DRILLS

No. 13 Natco, 16 Spindles.
No. C-5 Natco, 10 spindles.
28" Cin-Bick. Tap. Att., Gr. Box.
20" Barnes all-grd. self-oiling.
1 & 2 Sp. Demco, H.S.B.B.
1, 2 & 3 Sp. Allen, P. F. & T. A.
4 spindle L-G No. 2 M. T. p. f.
3½' Morris rad. A. C. Mtr. Dr.
5' Dreses Univ. rad., arr. m. d.

GRINDERS

No. 2 Heim Centerless, M. D.
No. 2 Brown & S. surface, b. d.
No. 78 W. & M. Auto. Surf. B.D.
No. 3 Wil. & Mor. auto., surf.
No. 7½ Gardner, 30" Disc, B.B.
No. 11 B. & S. Plain Cylinder, S. P. D.

LATHES

36"x16' Advance, Q. C. G., D. C. M. D.
24"x12' Schum, Boye q. c. g.
18"x10' Rahn-Larmon 8 Spd. G. H. M. D. Timk. Brg. New.
18"x8' Springfield, Q. C. G.
18"x6' Milw. Semi Q.C.G., B.D.
16"x6' Hendey QCG, Tap. Att.
16" Amerigan 8 Spindle Grd. Hd., Q. C. G., S. P. D.
14"x6' Hendey, Q. C. G.
9"x12" Sundstrand Mfg. grd. hd.

MILLING MACHINES

No. 20 Van Norman Duplex, Motor Drive.
No. 2, Van Norman Sub Head.
No. 3 LeBlond Univ. Vert. Hd.
No. 1 Kent Owens B. B. Hand.
No. 1 B. & S. Plain, cone head.
No. 2Y, B. & S. Pl., mtr. drive.
No. 4B Becker, vertical.
No 2 B. & S. Plain, B. G.
No. 2 Kempa, Universal, B. G.
No. 3 Kempa, Pl. B. G.
6"x48" Pratt & Whitney Thread.
6x80" Pratt & Whitney Thread.

PRESSES

No. 305 Bliss, S. S. single geared tie rod, 6" stroke.
No. 103 Bliss-Cons. Incl. Dble. Crank Flywheel.
No. 6 Fox "Superflex".
No. 1 Bliss Cam, Fly & Grd.
No. 4 Rockford, o. b. i., Grd.

SHAPERS

16" Milwaukee, B. G. Crank.
16" & 20" Steptoe b. g. crank.
20" G & E Hi-Duty SPD Gr. Bx.
20" G. & E., b. g. crk.
24" Stock. b. g. crank, M. D.
24" Cincinnati planer type.

MISCELLANEOUS

Bolt Cut., 1" Landis Lead Scr.
Bolt Cut., 2½" Landis Lead Scr.
Broach, No. 2 LaPointe S. P. D.
Die Filer, No. 5 Rear., m. d., new.
Die Filer, No. 5 Thiel, m. d.
Gear Cut., No. 3—26"—B. & S.
Gear Hobber, No. ½ S. & S.
Nibbler, No. 2 Campbell, M. D.
Planer, 30x30x10' Am. Box Tbl.
Punch & Shr., No. 55 H. & W.
Riv. Hmrs. Nos. 1AA, 2A, 3A, 3A H. D., & 5A High Speed.
Riv. Spin. ⅜" Linley, M. D.
Saw, 9x9 Peer. univ. shpg. m. d.
Saw, 6x6" Peer. univ. shpg. m. d.
Screw Mch., No. 0 B&S H., M. D.
No. 1 B. & S. semi-auto. b. d.
Shr., 6'x14 ga. D. & K., sq., m. d.
Shear, 10' x 14 ga. D. & K. Square, Motor Drive.
Shear, No. 138 Marshalltown Rotary, Serpentine, M. D.

George M. Bernstein & Co.

12 SO. CLINTON STREET CHICAGO, ILLINOIS

MOSER'S HIGH GRADE TOOLS

2¼" Model A Cleveland Automatic.
No. 24 New Britain Chucker.
20" Barnes 4-Spdl. A. G. H. Drill.
Rockford Horiz. Drilling and Boring Machine with outer support, sliding col. on hd., equipped with 4-speed A. C. Motor, table 24"x72".
4'—12" col. Foodick Radial Drill, gear box drive, including motor.
No. 2½ Bath Universal Grinder.
52" Gardner Tbl. Type Disc Gr., M. D.
No. 1 Gardner Dbl. End Grinder.
No. 3A High Speed Hammer.
16"x6' Prentice Q. C. G. Lathe.
16"x6' Rock. Q. C. G. Lathe, 3 & 4-jaw chks. 2" Garvin Die Slotter.
F. B. Shuster ⅝" cap. Wire Straightener.
No. 4 B. & O. Turret Lathe, A. C. collets.
No. 4 B. & O. Turret Lathe, A. C., B. F., P. F to turret slide.
No. 4 W. & S. Turret Lathe. P. F. to turret, P. F. to cut off slide.
No. 3 Gisholt A. G. H. Screw Mch., P. F. to turret, A. C. & B. F., motor drive including motor.
No. 4½ R. & K. Press.

MOSER MACHINE TOOL SALES, 1008-10 W. CLYBOURN ST., MILWAUKEE, WISCONSIN

FROM THE WORLD'S LARGEST STOCK OF MACHINE TOOLS WE OFFER YOU

MISCELLANEOUS ITEMS

No. 1 Long & Allstatter Gate Shear Cap. ¼" x 16' Motor Drive.

Carlin Alligator Shear, Cap. 6" S.P.D.

8"x8"x1" Kling Double Angle Shear, Motor driven.

McCabe ½" Pneumatic Flanger

No. 2A Williams & White Horiz. Bending & Straightening Machine; 150 ton capacity.

Sutton Roller Leveller. Cap. 60" x 16 gauge, M.D.

5,000-lb. Erie Steam Hammer. Stroke 48", Bet. Frames 90".

75 & 100 ton Henry & Wright Dieing Presses.

No. 4 Cleveland Guillotine Shear. Cap. 3" Round bars, 2½" Square bars.

Stolp Lock Seamer. Takes 11½" W x 16" long sheets, M.D.

No. 308 Toledo Seamer. Bet. housings 48", dist. under crown 30", M.D.

Tishken Strip Straightener & Cut-off Mach. Cap. 1½" Strip, M.D.

6K Cleveland Coining Press. 600 ton cap.

No. 12A Bliss Die Spotting Press, Arch frame, Bet. Uprights 43".

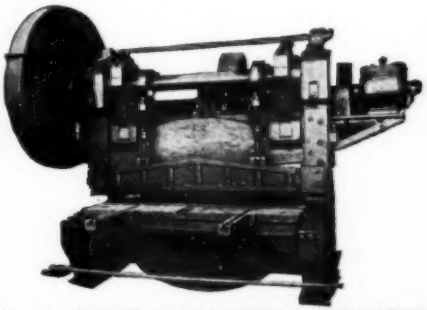
60" x 24" x 18' Ingersoll double face milling machine.

Type F & BG Keller Die Sinkers.

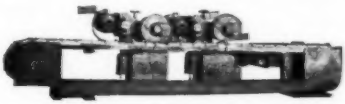
C. L. Hawes Continuous Feed Straight Line Grinder & Polisher: Two polishing heads, feed table 7' long.

150 H.P. General Electric Dynamometers.

16A Blanchard Automatic Surface grinder.



No. 1 LONG & ALLSTATTER GATE SHEAR



C. L. HAWES CONT. FEED STRAIGHT LINE GRINDER & POLISHER

These are but a few of the thousands of machine tools in our stock. We have a complete line of LATHES, MILLING MACHINES, GRINDERS, PRESSES, DRILL PRESSES, CHUCKING MACHINES, SCREW MACIHNES, BROACHING MACHINES, BORING MILLS, BULLDOZERS, GEAR MACHINES, UPSETTERS, FORGING ROLLS, LAPPING MACHINES, PLANERS, PUNCHES & SHEARS, SHAPERS, ETC.

SEND US YOUR INQUIRY.

Ask for a Copy of Our No. 39 Handy Pocket Reference

LOUIS E. EMERMAN & CO.

1761 ELSTON AVE., CHICAGO, ILLINOIS

Index To Advertisers

Aaron Machinery Co. 161
Abart Gear & Machine Co. 76
Acme Equipment Company 190
Acme Industrial Co. 107
Adams, Ogden R. 167
Air-Way Pump & Equipment Co. 114
Alco Tool Company 89
American Broach & Machine Co. 57
American Tool Works 68
Anderson Bros. Mfg. Co. 106
Armglo Company 143
Armstrong-Blum Mfg. Co. Inside Front Cover
Armstrong Bros. Tool Co. 4
Auto Moulding & Mfg. Co. 130
Avey Drilling Machine Co. 7

Baldor Electric Co. 125
Bansbach Machinery Corp. 168
Bates Marking Devices, H. O. 77
Baumbach Mfg. Co., E. A. 58
Beal & Co., Jos. 161
Beatty Mch. & Mfg. Co. 111
Bennett-Rafkin Machine Tool Corp. 171
Berkeley Equipment Co. 8
Bernstein & Co., Geo. M. 191
Beverly Shear Co. 122
Black Diamond Saw & Mch. Works 123
Blank & Buxton Machinery Co. 137
Bieser Machinery Co. 165
Botwinik Brothers 172
Bradley Machinery Co. 165
Bremil Mfg. Co. 134
Brewster & Co., Wm. C. 96
Bridgeport Machines, Inc. 66
Brooks Co., B. D. 168
Brown & Sharpe Mfg. Co. 9
Brown Machinery Co. 174
Bryant Chucking Machine Co. 47
Buffalo Forge Co. 12
Builders Iron Foundry 153
Burgess Battery Co. 149
Burke Machine Tool Co. 144
Burns Machinery Co., C. B. 170
Burns Machinery Co., F. W. 189
Burr & Son, J. T. 90

Camm-Blades Machinery Co. 164
Canedy-Otto Mfg. Co. 41
Carboloy Co., Inc. 142
Carroll & Son, Wm. 90
Cerro de Pasco Copper Corp. 195
Chicago Pneumatic Tool Co. 59
Chicago Wheel & Mfg. Co. 98, 99
Cincinnati Machinery & Supply Co. 177
Cincinnati Tool Co. 125

Colonial Broach Co. 64
Colwell, Co., S. G. 102
Cone Automatic Machine Co. 60
Continental Machines, Inc. Front Cover
Conway Clutch Co. 48
Cullman Sales Co. 150
Cullman Wheel Co. Back Cover
Cushman Chuck Co. 45

Daniels, C. R. 164
Danly Machine Specialties 120
Davis Mchy. Co. 168
Dayton-Rogers Mfg. Co. 113
Dearborn Gage Co. 155
Dearborn, J. W. 90
Delta Equipment Co. 176
Delta Manufacturing Co. 19
Desmond-Stephan Mfg. Co. 94
Detroit Stamping Co. 105
Do All Saws 63
Dony Machinery Co., D. E. 165
Dreis & Krump Mfg. Co. Inside Back Cover
Dremel Manufacturing Co. 91
Drive-All Mfg. Co. 100
Duro Metal Products Co. 85
Dyer Welder & Engineering Co. 123

Eastern Cutter Salvage Corp. 6
Eastern Machinery Co. 181
Economy Machine Products Co. 110
Eisler Engineering Co., Inc. 141
Elgin Tool Works 21
Elmes Engineering Works, Chas. F. 37
Elyria Belting & Machinery Co. 167
Emerman, & Co., Louis E. 192
Engineering Service Inc. 104
Erickson Steel Co. 108
Errington Mechanical Laboratory 121
Esco Eng. & Sales Co., Inc. 40
Esseley Machinery Co., E. L. 184

Failor-Strafer Machinery Co. 163
Falk Machinery Co., Inc. 184
Famco Machine Co. 110
Federal Press Co. 128
Federal Products Corp. 101
Flexrock Company 129
Flynn Manufacturing Co. 58
Fuchs Machinery & Supply Co. 166
Fulflo Specialties Co. 81

Galland-Henning Mfg. Co. 70
Gallmeyer & Livingston Co. 146
Gaston Power Tools Co. 114

Index To Advertisers, Con't.

General Blower Co. 164
General Tool & Die Co. 84
Gits Brothers Mfg. Co. 95
Glenzer Co., J. C. 55
Globe Machinery Co. 161
Gorton Machine Co., Geo. 51-128
Graham Mfg. Co. 136
Grand Machinery Exchange 168
Grandahl Tool & Machine Co. 82
Grant Mfg. & Machine Co. 90
Greenerd Arbor Press Co. 115
Grob Brothers 17
Grobet File Corporation of Am. 76

Hamilton Tool Co., The 62-141
Hannifin Mfg. Co. 11
Hardinge Brothers, Inc. 3
Harnischfeger Corp. 33
Hartford Special Machinery Co. 130
Harvey Goldman & Co. 173
Harvey Mfg. Company 118
Heim Co., The 168
Heimann Mfg. Co. 122
Heuser Manufacturing Co. 140
Hill-Clarke Machinery Co. 175
Hisey-Wolf Machine Co. 157
Hobart Brothers Co. 1
Hotel Auditorium 141
Hotel Lafayette 145
Hotel Philadelphian 151
Hyman & Sons, Joseph 164

Illinois Testing Laboratories, Inc. 147
Imperial Metal Products Co. 126
Indianapolis Machinery & Supply Co. 178
Iuland Machinery Co. 190
Interstate Machinery Co. 179
Iroquois Machinery Co. 184

Janette Manufacturing Co. 80
Johnson & Sons Machinery Co., Wm. C. 107-166
Johnson Gas Appliance Co. 147
Jones Machine Tool Co. 166

Kearney & Trecker Corp. 35
Klauber Machinery Co., E. L. 164
Koebel Diamond Tool Co. 132

L-W Chuck Co. 97
Lafayette Machinery Corp. 170
Lake Machinery Co. 188
Landis & Gyr, Inc. 154
Lang Machinery Co. 163
Lee & Son Co., K. O. 136
Lima Electric Motor Co. 93
Lipe Co., W. C. 196
Littell Machine Co., F. J. 124
Loshbough-Jordan Tool & Mch. Co. 120
Lowe Co., Chas. E. 166
Lucas & Son, Inc., J. L. 182
Luma Electric Equipment Co. 84

M. & S. Dresser Company 68
Machinists Tool Grinding Co. 88
McDonald Machinery Co. 185
McKenna Metals Co. 92
Machinery Manufacturing Co. 77
Madison-Kipp Corp. 131

Mall Tool Company 73
Marr-Galbreath Machinery Co. 165
Marshalltown Mfg. Co. 87
Master Chrome Service, Inc. 6
Master Tool Co., Inc. 6
Miles Machinery Co. 183
Metal Carbides Corp. 116
Michigan Chrome Co. 144
Modern Machine Corp. 78
Moore, Geo. W. 134
Morey Machinery Co., Inc. 108-184
Morris Machinery & Co., Inc. 174
Moser Machine Tool Sales 191
Mutual Mfg. & Supply Co. 168

N. I. A. A. 16
Nedco Company 140
Nelson Machinery Co. 168
New Britain Tool & Mfg Co. 86
New Method Steel Stamps, Inc. 102
Nicholson File Co. 29
Nielsen, Inc., 145
Nielsen Tool & Die Co. 88
Nilson Machine Co., A. H. 133
Nonslip Pulley Co. 93
Norgren Co., Inc., C. A. 139
Norton-Broadway Machinery Co. 182-192
Numberall Stamp & Tool Co. 116

O'Brien Machinery Co. 188
Oliver Instrument Co. 119
O'Neil-Irwin Manufacturing Co. 96
Osborne & Sexton Machinery Co. 188
Ott Machinery Sales, Inc. 186
Owatonna Tool Co. 120

Passman Bros. 188
Peters Tool Co. 116
Plunket Machine Co., J. E. 114
Postel Filing Mch. Co. 68
Printz Electric Co. 88
Procunier Safety Chuck Co. 18
Production Machine Co. 133

Quality Hardware & Machine Co. 109
Quality Tool Works 94
Quality Tool & Die Co. 62

R & L Tools 20
Racine Tool & Mch. Co. 151
Reeve-Fritts Co. 168
Regar, S. M. 164
Reich Mfg. Co., J. R. 149
Reliance Machinery Sales Co. 161
Remco Products Corp. 138
Rigid Tool Holder Co. 150
Ritterbush & Co. 169
Riverside Machinery Depot 186
Rivett Lathe & Grinder, Inc. 2
Rockford Drilling Mch. Co. 117
Rosenkranz, Weisbecker & Co. 164
Ross Co., David J. 103
Rotor Tool Co. 13
Royal Machinery Exchange 163
Russell Boring Bar Co. 102
Russell Machine Co. 164
Ryerson & Son, Inc., Jos. T. 24

S & S Machine Works 142
Sampson Tool Co. 164
Sarostan Co. 110
Schauer Machine Co. 82
Scott Machinery Sales 176

Index To Advertisers, Con't.

Segal Machinery Co. 166
Seneca Falls Machine Co. 118
Severance Tool Mfg. Co. 132
Shaw-Box Crane & Hoist Division 126
Sheldon Machine Co. 96
Simmons Machine Tool Corporation 178
Smith Power Transmission Co. 137
South Bend Lathe Works 22
Stackbin Corporation 119
Standard Machinery Co. 167
Standard Pressed Steel Co. 105
Stanley Works 15
Star Machine & Engineering Corp. 134
Steege Machinery Co., W. L. 124
Sterling Products Co. 143
Strong, Carlisle & Hammond Co. 180
Sundstrand Machine Tool Co. 53
Sutton Tool Co. 135

Tannewitz Works 138
Taylor Machine Co. 146
Toledo Pipe Threading Machine Co. 89
Tomkins-Johnson Co. 115
Torq Electric Mfg. Co. 10
Trico Fuse Co. 112
Triplex Machine Co. 82
Troyke, Alfred A. 142
Turner Machinery Company 83

Universal Engineering Co. 78-127
Used and Rebuilt Machinery 161-192

Victor Machinery Co. 190
Victor Machinery Exchange 187
Vine, R. A. 180
Vonnegut Moulder Corporation 145

Wade Instrument Co. 112
Wade Tool Co. 138
Walker-Turner Mfg. Co. 79
Walls Sales Corporation 154
Walton Co. 92
Wardwell Mfg. Co. 86
Wells Manufacturing Co. 75
Western Tool & Mfg. Co. 109-140
Western Tool Exchange 168
Westlof Tool & Die Co. 121
West Penn Machinery Co. 167
White Machinery Co., A. D. 172
White Dental Mfg. Co., S. S. 31
Whitney Metal Tool Co. 139
Wigglesworth Machinery Co. 167
Wilson, K. R. 14
Wisconsin Gear & Eng. Co. 163
Wittek Manufacturing Co. 117
Wolnick Machinery Co., H. F. 161
Worch Machinery Co., F. E. 168
Wyzenbeek & Staff, Inc. 69

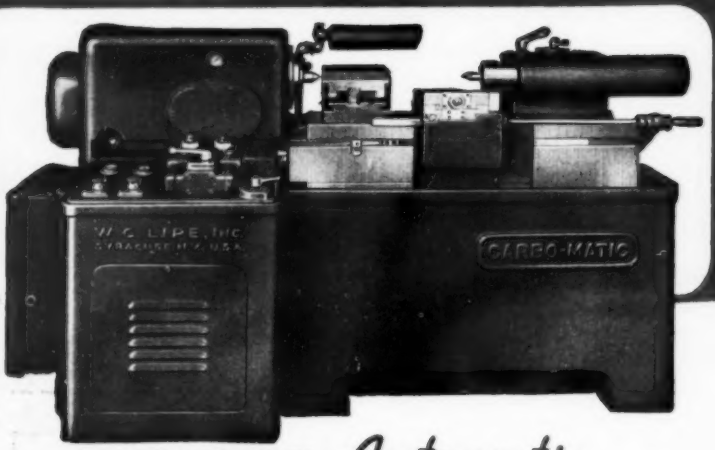
Zeeve, Alex 161
Zeh & Hahnemann Co. 151
Zoerman-Clark Mfg. Co., Inc. 112

AMERICA'S DEFENSE PROGRAM
begins in the Die Shop

IT goes without saying that Tool and Die Makers are in our first line of defense. Upon their handiwork depends almost the entire fabric of the enormous manufacturing program of Industry planned for the protection of the United States. In their tremendous task they will need the aid of all possible means for quickening and increasing their output of urgently needed tools and dies. For several years **Cerromatrix,** the low-temperature-melting alloy that expands slightly on solidifying, has been making substantial savings in die making time for hundreds of the country's leading metal-working shops. Send today for our new free Cerromatrix Manual.

CERRO DE PASCO COPPER CORPORATION
40 WALL STREET • NEW YORK, N.Y.
BRITISH ASSOCIATES: MINING & CHEMICAL PRODUCTS LTD., LONDON, ENGLAND
CANADIAN DISTRIBUTORS: [illegible]

ere's the **SPEED** *and* **PRECISION**
ou Need for **DEFENSE** & **MUNITIONS** *Orders*



THE FULLY *Automatic*

LIPE CARBO-MATIC LATHE

ES YOU THIS SPEED ON MUNITIONS

Mm SHELL—turning OD d facing end at the rate one per minute, floor to por.

ALUMINUM ALLOY AIRPLANE MOTOR PISTON— rough turn, finish turn, face and groove one per minute.

Now, as never before, the speed, smoothness and close limits of carbide-tool turning are at a premium. And Lipe CARBO-MATIC Lathes give you the set-up combinations, the fully automatic cycles, the brute power and chatter-free rigidity that high-speed, high-precision schedules demand.

You'll get turning tolerances that will be as close as those commonly produced by rough grinding. And you'll get simplicity and automatic operation that will permit one operator and one set-up man to tend a larger number of machines. Loading and unloading are the only manual operations. Hydraulic control governs the spindle clutch, the chuck and collet closer, the longitudinal and cross feeds and the tailstock quill. 8" swing over carriage, 30" between centers.

Investigate today. Write or wire for new, illustrated folder.

V. C. LIPE, Inc., Syracuse, N. Y.

Something to Crow About

BOX AND PAN BRAKE—

POWER BENDING BRAKE—

The Box and Pan Brake forms boxes or pans from one piece of metal. A straight brake as well as a box brake.

The Power Bending Brake is indispensible wherever a volume of heavy plate work is to be done. Forms a great variety of bends and shapes, without dies.

Send your bending problems and write for complete information on all our Press Brakes.

The World's oldest and largest manufacturer of all-st constructed machinery announce a new low priced m ern all steel press brake for the heavy sheet metals light plate work.

All the main members constructed of rolled steel pl Equipped with one bull gear inside each end housi Eccentrics made in one piece with bull gears. Adjust screws encased in supporting sleeves operate in ve cal non-oscillating position. All gearing, eccentrics, plungers and ram adjusting worms enclosed in oil.

Ram operates at variable speeds — slow when bend long sheets or fast when forming small pieces. Cha of speed is accomplished by turning hand wheel.

DREIS & KRUMP MFG. CO.

7440 LOOMIS BLVD. CHICAGO, ILLINOIS

Machine Tool Drives

Modernize

Your

LATHES,
SHAPERS,
MILLING MACHINES,
PUNCH PRESSES
with CULLMAN DRIVES

60-DAY FREE TRIAL OFFER

Here's your opportunity to find out what the Cullman Drive will do for you —in your plant and on your machines. Send us all data on machines to be equipped—we'll do the rest. There's no charge—no obligation on your part.

THE CULLMAN WHEEL CO.